COLORADO SPRINGS AIRPORT

COLORADO SPRINGS MUNICIPAL AIRPORT

MASTER PLAN

JVIATION®
A WOOLPERT COMPANY

Colorado Springs Municipal Airport

Airport Master Plan

2022

Prepared by Jviation, A Woolpert Company

for the city of Colorado Springs, Colorado

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1. Study Introduction

Introduction

This Airport Master Plan Update (MPU) for the Colorado Springs Airport (COS or the Airport) is being conducted to provide the City of Colorado Springs (City) and the Airport Advisory Commission (AAC) with a long-range plan for airport development that is visionary yet also reasonable and practicable. This plan is designed to produce a safe, efficient, economical, and environmentally sustainable air transportation facility that meets the region's existing and projected aviation demand levels in a thoughtful manner. The MPU, along with the accompanying Airport Layout Plan (ALP), is funded by the Federal Aviation Administration (FAA)and the Airport. It has been prepared in compliance with the Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*. Technical work is being conducted by a project team led by Jviation, a Woolpert Company, and supported by Felsburg Holt & Ullevig (FHU).

The principal goal of the MPU is to provide a carefully considered, systematic approach to the Airport's overall maintenance, development, and operation over a 20-year planning period. At its core, this planning effort was designed to identify and plan for current and future airport facility needs well in advance of the actual demand for those facilities. The MPU is also designed to review and assess the Airport's current conformance with federal and state airport design and operational standards to ensure that the Airport continues to operate as safely as possible. The MPU will also ensure that COS can appropriately coordinate project approvals, design, financing, and construction, while avoiding noncompliance issues.

Master Plan Purpose and Objectives

The overall purpose of the COS MPU is to define the City's approach for long-term airport development. This MPU will provide the framework to guide the future development that will satisfy current and future aviation demand in a logical and financially feasible manner, while also considering and incorporating relevant environmental and community factors. Consistent with this purpose, the project team is coordinating with the Airport to identify objectives to be addressed in this MPU, which are listed below.

- Prepare a vision of future airport development.
- Effectively engage stakeholders and the public.
- Evaluate the design of Runway 17R-35L to address Hot Spot #1 by decoupling the Runway 13-31 and Runway 17R-35L intersection.

- Inventory existing facilities and demonstrate the significance of the Airport within the community.

- Inventory existing environmental resources and assess environmental impacts of proposed projects and the need for additional environmental documentation. Study the resiliency of the Airport's energy and water resources.

- Integrate the findings from the 2020 Land Use Study to harmonize and strengthen a land-use vision for the Airport and its surroundings.

- Conduct a Geographic Information Systems (GIS) Needs Assessment to identify current utilization and make recommendations to improve and maximize capabilities of GIS at the Airport.

- Obtain new aerial imagery to support the ALP and acquire survey data required for runway design.

- Re-evaluate the Forecast of Aviation Demand from the 2020 Land Use Study, to address impacts resulting from COVID-19, the FAA's updated Terminal Area Forecast, and the recent growth in air service, including the introduction of passenger service at COS by Southwest Airlines.

- Assess facility requirements and analyze runway utilization, the future need for improved instrument approaches, and the costs/benefits of decoupling the existing runway configuration.

- Plan surface transportation at and to the Airport to improve connectivity and convenience.

- Analyze alternatives for development areas by identifying potential land acquisitions to accommodate airport growth and appropriately controlling areas sensitive to aircraft safety.

- Study and provide recommendations to address taxiway Hot Spots as identified by the FAA.

- Review alternative locations for airside, landside, terminal, and support features to accommodate long-term demands with specific attention to Peak Innovation Park.

- Identify future capital improvements based on the analysis of existing and future demand, as well as a financial evaluation to identify how those improvements may be funded through a 20-year Capital Improvement Plan (CIP). New cost estimates that can be 'escalated' based on inflation and other factors will be prepared for AIP projects to assist the Airport in this long-term financial planning effort.

These key issues and their potential solutions align with goals included in the 2020 Colorado Aviation System Plan (CASP). The goals defined for the entire state airport system help guide future development at individual airports (including the Colorado Springs Airport) and include the following:

- **Safety and Efficiency**: Advance Colorado's airport system by promoting and preserving safe and efficient facilities, on and off airports.
- **Access and Mobility**: Provide Colorado's airports with infrastructure and sufficient capacity to enable adequate public access and mobility utilizing the aviation system.
- **Economic Sustainability**: Support sustainable economic growth and development to continue Colorado's existing status as a leader in technology, testing, and aerospace industry.
- **System Viability**: Preserve airport system assets to promote fiscal responsibility and sustainable, cost-effective investments to ensure the system's long-term viability.

Additionally, the COS MPU must also fulfill the broad master planning goals established by the FAA in AC 150/5070-6B, *Airport Master Plans*:

- Document issues that the proposed development will address.
- Justify the proposed development through the technical, economic, and environmental investigation of concepts and alternatives.
- Provide an effective graphic presentation of airport development and anticipated land uses in the vicinity.
- Establish a realistic schedule for implementing the development proposed in the MPU, particularly the short-term capital improvement program.
- Propose an achievable financial plan to support the implementation schedule.
- Provide sufficient project definition and detail for subsequent environmental evaluations that may be required before the project is approved.
- Present a plan that satisfies local, state, and federal regulations.
- Document policies and future aeronautical demand to support municipal or local deliberations on spending, debt, land use controls, and other policies necessary to preserve the integrity of the Airport and its surroundings.
- Establish the framework for a continual planning process.

Overview of Airport Issues and Concerns

COS's previous MPU was completed in 2013 with an ALP update conducted in 2018. Since those efforts, several Airport issues and focal points identified in that master planning effort have been addressed through the completion of specific projects and the update of specific airport documents. Other issues that have not been addressed in prior planning efforts or resolved due to changing industry circumstances and master plan assumptions will be identified and addressed in this MPU.

Some of the following specific issues and concerns have already been identified to be addressed within this MPU:

- **Public Outreach**: Collaborate with Airport staff, stakeholders, users, community leaders, businesses, and residential neighbors to generate an inclusive and useful MPU for all audiences.

- **Hot Spot Analysis**: Identify a solution for decoupling Runway 17R-35L and Runway 13-31 at the northwest end of the airfield to eliminate a safety concern.

- **Geographic Information Systems Integration**: A complete GIS Needs Assessment will be included in this MPU will assist in ongoing management of ALP and Airport data. The assessment will identify capabilities, existing systems, and needs; create a catalog of Airport GIS data; coordinate external resources; and establish platform recommendations and an implementation plan.

- **Transportation Connectivity**: Address the Airport's internal transportation and regional connectivity needs. An assessment of existing facilities, plans, and travel patterns will be conducted to understand how these elements are integrated with the Airport's vision and goals. Strategic alternatives will be developed to guide future connectivity.

Airport Master Plan Communication & Coordination

Public involvement is an integral part of any airport master planning effort. Such participation encourages information sharing and collaboration among the community and the airport stakeholders to generate collective interest in the outcome of the study. Stakeholders typically include airport management, advisory boards or commissions, tenants, users, local businesses and residents, resource agencies, elected and appointed public officials, and the general public. With such a diverse pool of participants, a variety of forums will be employed to enhance the effectiveness of the project coordination effort.

- Establish a Planning Advisory Committee (PAC) to ensure the MPU addressed the key issues facing the Airport and its surrounding community. The PAC will

convene three times in conjunction with project delivery milestones deliverables. The PAC membership will represent the following groups:

  - Stakeholders
  - Tenants
  - Users
  - Community Leaders
  - FAA and Colorado Department of Transportation (CDOT) Division of Aeronautics representatives

- A Technical Work Group (TWG) may be assembled on an ad hoc basis and meet as required to provide feedback and input on technical aspects of the work effort. The TWG may consist of the following members:

  - Colorado Springs Airport Staff
  - City Planning Staff
  - El Paso County Staff
  - Tenants
  - Users
  - FAA Air Traffic Control

- Use an online survey of key airport stakeholders (including users, tenants, based aircraft owners/pilots, transient pilots, and airport users at large) to solicit feedback regarding a variety of topics like Airport strengths and weaknesses, the future of the Airport, and the participant's individual activities at the Airport. The survey results will guide planning actions documented in **Chapter 4, Airfield Capacity & Facility Requirements**.

- Create/employ various public outreach materials and methods to generate public awareness of the MPU. The materials and outreach program will keep interested parties informed of the planning process, solicited input, and facilitate decision-making during the process. The outreach materials will include a project website, press releases for local media, meeting advertisements, and social media campaigns.

- Other forms of public involvement will include regular public briefings to the AAC, as well as two open houses following key MPU milestones. The open houses will provide an opportunity to engage the public in meaningful conversation about the Airport and the MPU. Other additional briefings and technical meetings will be organized with key agencies, stakeholders, and public officials, as required. Meeting notes are included in the appendices.

Master Plan Study Elements

The COS MPU will be consistent with the guidance provided in FAA AC 150/5070-6B, *Airport Master Plans*, and other industry-accepted principles and practices. Specifically, this Master Plan's chapters identify future facility requirements and provide the supporting rationale for their implementation.

Chapter 1, Introduction provides an overview of the MPU, including its purpose, objectives, work products, and the overall structure of the project.

Chapter 2, Inventory establishes a sound basis for plan and program development. The Inventory compiles essential data regarding the physical, operational, and functional characteristics of COS, its sub-components, and its environs. It should be recognized that environmental factors are considered and weighed throughout the master planning process starting in this chapter.

Chapter 3, Aviation Activity Forecast provides a foundation for the MPU by utilizing local socioeconomic information and national air transportation trends to project levels of aviation activity that can reasonably be expected at COS over the 20-year planning period. Because many of the proposals and recommendations in the MPU are principally based on these forecasts, it is critical that they be both reasonable and defensible. ***Note that the aviation forecasts must be officially reviewed and approved by the FAA.***

Chapter 4, Airfield Capacity & Facility Requirements utilizes the results of Chapter 3 to assess the ability of existing airside and landside facilities to meet the projected level of demand for the planning horizon. This analysis defines requirements for facilities, outlines expansion of existing facilities, and determines if the facilities will meet the forecasted demand over the 20-year planning period. Additionally, airport facilities will be examined to identify operational and safety improvements needed to accommodate current and future aircraft. This analysis includes compliance with FAA airport design standards, airspace clearance requirements, facility improvements, and possible navigational aids to enhance the safety and efficiency of aircraft operations.

Chapter 5, Development Alternatives & Recommended Plan presents a variety of solutions to accommodate the anticipated facility needs identified in Chapter 4. Various facility and site plan alternatives will be proposed and compared to weigh their ability to meet the projected facility needs. This analysis will produce a preferred development alternative that will best meet the Airport's facility requirements and its long-term goals in an efficient and appropriate manner. Comparative matrices of each alternative's strengths and weaknesses will be employed to determine a single direction for development. This evaluation method focuses on several key criteria, including, but not limited to, cost, efficiency, feasibility, operational effectiveness. An environmental screening of the preferred development plan will also be included in this chapter.

Chapter 6, Airport Layout Plan provides both a graphical and narrative description of the recommended plan for the use, development, and operation of the Airport. ***Note that the Airport Layout Plan set must be officially reviewed, approved, and signed by the Airport and the FAA.***

Chapter 7, Financial Plan focuses on the capital improvement program which defines the schedules, costs, and funding sources for the recommended development plan. It is important that the development program is practical, reasonable, and capable of enhancing the economic viability of the Airport.

2. Inventory of Existing Conditions

The inventory consists of data collection and documentation of the existing conditions at Colorado Springs Airport (COS or the Airport and officially titled as City of Colorado Springs Municipal Airport) and its surroundings. It serves as the foundation from which facility deficiencies and proposed improvements may be identified later in the Master Plan Update (MPU). This inventory, like other study elements, follows the guidance outlined in Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*.

Airport Overview

Located at the foot of Colorado's Front Range, the Colorado Springs Airport lies in the southeast portion of the City of Colorado Springs (Colorado Springs or the City) and within El Paso County (the County). COS is a publicly owned (by the City), public-use, small hub Commercial Service (CS) airport. It provides the City, the County, and other communities within the region immediate access to aviation facilities designed to accommodate a range of activities and users, including commercial airline service with jet aircraft, to general aviation operations with piston and turbine aircraft, to military operations.

The Airport is a critically important transportation and economic asset to Colorado Springs and the region. In addition to its aviation-related benefits driven by on-airport businesses and facilities, the Airport supports civilian and military personnel at Peterson Space Force Base (SFB) and provides a reliable alternative for businesses and leisure travelers who would otherwise drive more than an hour and a half north to Denver International Airport. The complete economic benefit of the Airport is reflected in the *2020 Colorado Aviation Economic Impact Study*, which estimates the total annual aviation and non-aviation-related benefits attributable to COS to be 25,093 jobs, over $1.5 billion in payroll, and nearly $3.5 billion in economic activity. This includes the Peak Innovation Park located on Airport property that is home to Amazon (which recently constructed three new facilities), Northrop Grumman, Aerospace Corporation, among others that all generate activity in the local and regional economies.

The previous COS Airport Master Plan was completed in 2013, with an Airport Layout Plan (ALP) update completed in 2018. Since the time of that planning effort, the Airport and surrounding areas have experienced significant growth. Airline service at COS has expanded rapidly with the addition of new carriers, including Southwest Airlines, and the reintroduction of past providers, such as Frontier Airlines. The City continues to experience significant annual population growth and business development that likely warrants enhanced Airport facilities and activities. This continued growth combined with the rapidly changing dynamics of the aviation industry has required that the COS Airport Master Plan be updated to formally analyze current and forecasted operational characteristics and facilities, as well as to evaluate and revise the Airport's program for future

development. The overarching goal of this study is to identify a long term (20-year) airport development plan that prepares the Airport for future demands and requirements from the Colorado Springs area and the surrounding region.

This chapter focuses on the entire aviation facility at COS and its surrounding environment. It combines existing supporting data from multiple sources into a single document to provide a foundation for the subsequent planning analyses conducted as part of the MPU. Specifically, Chapter 2 examines three basic elements that contribute to the existing and future development of Colorado Springs Airport:

1. the Airport's facilities (e.g., runways, taxiways, aircraft parking aprons, commercial passenger terminal, hangars, maintenance facilities, ground access, etc.);
2. the relationship between the Airport, the regional airport system, and the National Aviation System (NAS); and
3. the Airport environs.

Existing data associated planning documents was incorporated into this chapter to ensure accuracy. The information collected and included in this chapter was obtained from many sources, including those listed below:

- Airport site visits;
- Tenant and user interviews;
- Airport administration records and documents;
- FAA 5010 forms;
- COS Airport Master Plan (2013);
- 2020 Colorado Aviation System Plan (CASP); and
- Other pertinent data from the FAA, the Colorado Department of Transportation (CDOT) Division of Aeronautics, and the Colorado Springs Airport Administration and Advisory Commission.

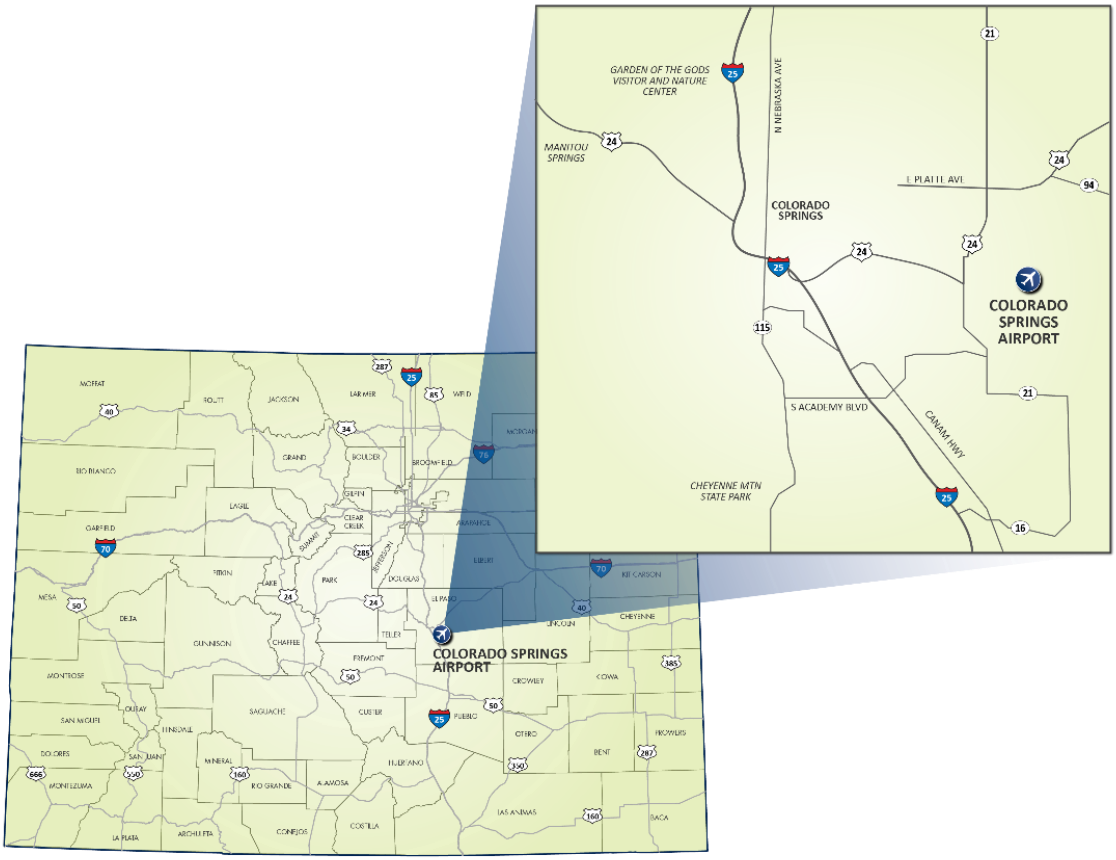
Subsequent chapters in this Airport Master Plan detail forecasts of the Airport's aviation activity, the ability of Airport facilities to safely and efficiently meet the needs associated with that projected aviation activity, and the recommended future development within and around Airport property.

Airport Setting

The Airport's location within the region is shown in **Figure 2-1**. Colorado Springs is the seat of El Paso County, whose estimated populations in 2020 were 478,961 and 730,395[1], respectively. The City and County's location along Colorado's Front range is a highly desirable setting for people seeking an active work/play lifestyle.

[1] Colorado Department of Local Affairs

Figure 2-1: COS Regional Map



Source: Jviation, a Woolpert Company

While the origins of Colorado Springs can be traced to the 1860s gold boom when mining companies settled the area, the City was officially founded in 1871 by General William Jackson Palmer. General Palmer was a veteran of the Civil War and a railroad magnate, developing several railways throughout the West that eventually brought him to the foot of Pikes Peak. Amazed by the scenery and beauty of the area, he decided it was the ideal location for a community.

Mining continued to be the primary economic driver, spurring residential and tourist developments throughout the region, until the early 1900s. During World War II, the City and surrounding areas developed a significant military presence that still exists today. Currently, there are five prominent military installations located within the immediate area: the United States Air Force Academy, Cheyenne Mountain Space Force Station, Peterson Space Force Base (previously Peterson Air Force Base), Schriever Space Force Base (previously Schriever Air Force Base), and Fort Carson, home of the Army's 4th Infantry Division.

The Airport is situated approximately 12 miles southeast of downtown Colorado Springs, five miles southwest of Interstate 25, and six miles north of U.S. Route 24 (S Powers Boulevard). Visitors access the commercial terminal from the south

and west via Milton E. Proby Parkway, while visitors to general aviation landside buildings can access the Airport via several east-west connector streets that stem from U.S. Route 24. Peterson SFB occupies the entire northeast side of the airport property and is accessed from U.S. Route 24 to the west and north, and Marksheffel Road to the east.

The Airport itself has approximately 7,444 acres with a defined elevation of 6,187.1 feet Mean Sea Level (MSL). The FAA site number for COS is 02543*A. The Airport Reference Point (ARP) is Latitude 38° 48' 20.9270" N and Longitude 104° 42' 02.7890" W. The mean high temperature of the hottest month (July) at the Airport is 84.8 degrees Fahrenheit. The mean low temperature of the coldest month (January) at the Airport is 18.5 degrees Fahrenheit.

Airport History

Originating in the 1920s based on the need for a municipal aviation facility for Colorado Springs, the Airport began operations in 1925 and was officially opened in 1927. It original consisted of 640 acres and was configuration with two gravel runways. The military took control of the facility just prior to the United States' entry into World War II, later relinquishing control back to the City.

The existing commercial terminal facility, opened in 1994, is actually the third iteration of such facilities. The first terminal building was located on the north side of the Airport and is currently under the management of Peterson SFB; the second facility was located west of S Powers Boulevard.

Development of the Airport over time has progressed in many forms in order to fulfill the various need of its users and activities. **Table 2-1** provides a listing of FAA Airport Improvement Program (AIP) projects over the past 15 years to illustrate where major investments have been most recently directed. Note that airfield pavement represents a majority of this investment, with funds primarily devoted to pavement rehabilitation for runways and taxiways.

Table 2-1: COS AIP History

Year Grant Received	Project	Total Cost
2005	Runway 17L/35R Reconstruction	$17,032,811
2006	Runway 17L/35R Reconstruction	$272,258
2006	Runway 17L/35R Reconstruction	$275,986
2006	Runway 17L/35R Reconstruction	$14,667,329
2006	Runway 17L/35R Reconstruction	$786,732
2007	Taxiway E, G, and H Reconstruction – Phase I	$4,324,857
2007	East Vehicle Service Road-Phase I	$422,262
2007	Business Park DAR Roads	$7,677,667
2008	Taxiway E, G and H Reconstruction – Phase II	$9,115,128
2009	Taxiway G & H Reconstruction – Phase I	$1,841,304
2009	Reconstruct Taxiway E4 & E5 – Partial	$6,673,418
2009	Taxiway G & H Reconstruction – Phase II	$811,421
2009	Runway 12/30 Rehabilitation – Design	$336,801

Year Grant Received	Project	Total Cost
2009	Taxiway G & H Reconstruction – Phase III	$7,488,221
2010	Master Plan Update/Reconstruct Taxiway H and Taxiway M	$1,571,331
2010	Taxiway G & H Reconstruction – Phase IV	$3,199,630
2010	Runway 12/30 Rehabilitation – Construction	$5,827,997
2011	Taxiway E, G, and H Reconstruction – Phase III	$10,009,803
2012	Taxiway M & F Reconstruction	$6,844,971
2013	Taxiway E, G, and H Reconstruction – Phase IV	$13,915,564
2013	Taxiway E, G, and H Reconstruction – Phase IV	$15,167
2014	Re-Stripe Runways 17R/35L and 17L/35R	$1,912,772
2014	Taxiway E, G, and H Reconstruction – Phase V	$7,353,414
2014	Taxiway A Rehabilitation	$3,373,988
2015	Rehabilitate Taxiway (Terminal Taxilanes) – Rehabilitation of Terminal Apron and Trench Drain System	$12,319,120
2016	Reconstruct Taxiway C from Taxiway C7 to Taxiway H	$10,658,454
2017	Rehabilitate Taxiway G and Terminal Connectors, Phase 1	$8,605,972
2017	Rehabilitate Taxiway G and Terminal Connectors, Phase 2 – Design	$413,523
2018	Rehabilitate Taxiway G and Terminal Connectors, Phase 2 – Construction	$11,444,432
2018	Rehabilitate Taxiway G and Terminal Connectors, Phase 3 – Design	$446,261
2018	Rehabilitate Taxiway G and Terminal Connectors, Phase 3 – Construction	$10,829,607
2019	Construct Deicing Pad and Rehabilitate Runway 17R/35L – Designs	$2,162,576
2020	Construct Deicing Pad	$12,153,953
2020	Rehabilitate Runway 17R/35L – Construction	$57,241
Total		**$194,857,137**

Source: Colorado Springs Airport

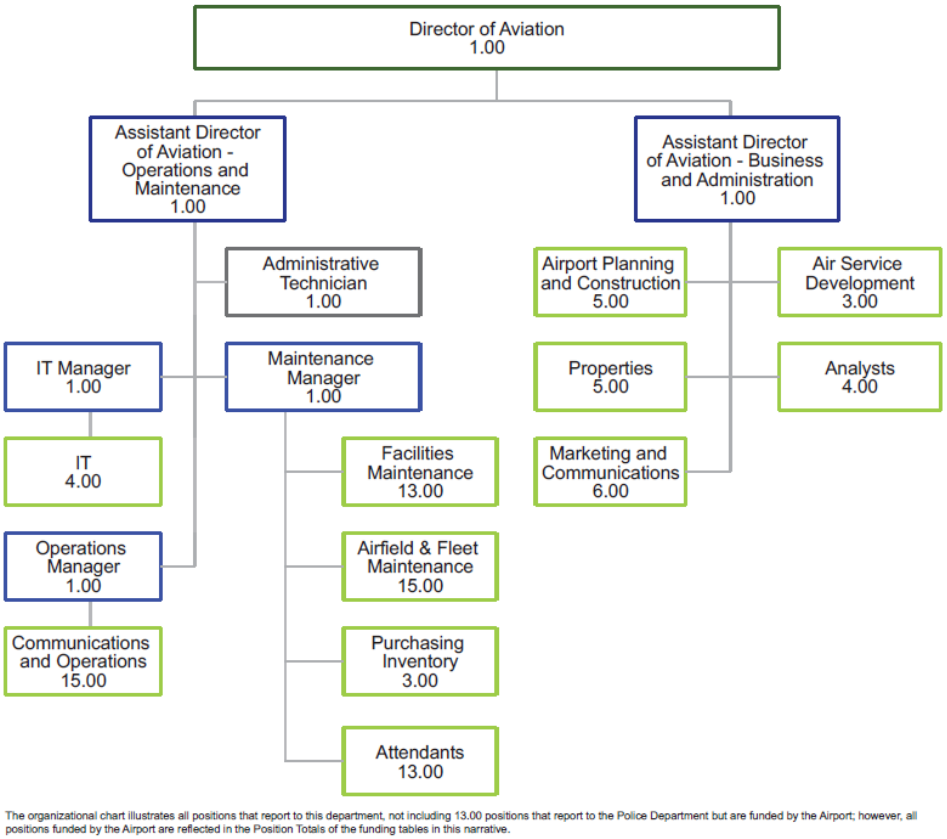
Other airport improvements have been funded through Passenger Facility Charge (PFC) Program funds, the CDOT Division of Aeronautics Aviation Grant Program, and local investments.

Airport Management and Administration

The Colorado Springs Airport is owned and operated by the City of Colorado Springs, Colorado as a separate enterprise of the City. Additionally, the Airport is overseen by an Airport Advisory Commission (AAC), established by the City Council in 1978. The AAC is a seven-member board that supports the Mayor, the City Council, and the City Planning Commission on matters related to airport management. The AAC meets monthly, with each commissioner serving up to two three-year terms.

The Airport is managed by a dedicated full-time Director of Aviation who is supported by two Assistant Directors of Aviation, and a full complement of staff. **Figure 2-2** illustrates the current airport organizational chart with position types and number of employees.

Figure 2-2: COS Organizational Chart



Source: Colorado Springs Airport

Integration with Colorado Springs City Strategic Plan

The Airport aligns its vision and associated development initiatives with the Colorado Springs City Strategic Plan. Goals identified in the Strategic Plan are broad and apply to City departments, including COS. Specific to the Airport, three goals have been identified as have three general initiatives designed to meet those goals (see **Table 2-2**).

Table 2-2: 2021 Strategic Plan Initiatives

Goal	Initiative
Promoting Job Creation	Continue efforts to diversify revenue through air service growth and economic development.
Building Community & Collaborative Relationships	Plan for the Airport of 2040, ensuring compatible land use and adequate protections for future needs.
Excelling in City Services	Ensure a safe, efficient, and financially stable airport.

Source: Colorado Springs Airport

Recent or ongoing developments illustrate the Airport's effort to support these initiatives. The Airport continues to diversify its air service offerings, evidenced by Southwest Airlines' initiation of service in 2021. Additionally, the completion of a Land Use Compatibility Study in October 2020 and the undertaking of this

Airport Master Plan support the vision of the Airport in 2040. Finally, the Airport continues to enhance its levels of operational safety and efficiency, as well as to be fiscally stable and self-sufficient.

Airport Finances

The FAA requires that those airports that accept financial grants "…maintain a fee and rental structure for the facilities and services at the airport which will make the airport as self-sustaining as possible under the circumstances existing at the particular airport, considering such factors as the volume of traffic and economy of collection."

Because COS is owned and operated by the City of Colorado Springs, the fiscal responsibility of the Airport resides with the City and, by extension, airport management. Airport finances are managed through a municipal enterprise fund (a fund segregated in purpose and use from other municipal funds or accounts. Revenue generated by the enterprise activity and deposited back into the enterprise fund is the principal funding source for that enterprise). In this case, the airport enterprise fund is dedicated to the operation and maintenance of COS. Airport revenues are generated from airline operating fees, automobile parking fees, rental car fees, ground, building and terminal rent, and other facility charges (see **Table 2-3**). It is important to note that the Airport is a fully self-sustaining public enterprise and receives no local tax revenue.

The majority of facilities on the Airport, including all of the hangar structures, are privately-owned but where facility structure owners have a ground lease with the Airport. The facility owners are also taxed at the prevailing property tax rate, and as result, the property taxes generate revenue for the City in addition to fees generated by the leases.

Refer to Chapter Seven, *Program Implementation Plan*, for additional information on the Airport's financial structure.

Table 2-3: COS Rates and Fees

Source/Service	Fee
Landing and Other Airfield-Related Charges	
Signatory Operating Fees	
Landing Fee	$1.33 per 1,000lbs MGLW
Maintenance/Ferry Landing Fee	$0.67 per 1,000lbs MGLW
Diversion Landing Fee	$0.67 per 1,000lbs MGLW
Non-Signatory Scheduled Fees	
Landing Fee	$1.66 per 1,000lbs MGLW
Maintenance/Ferry Landing Fee	$0.83 per 1,000lbs MGLW
Diversion Landing Fee	$0.83 per 1,000lbs MGLW
Non-Signatory Itinerant Fees	
Landing Fee	$2.00 per 1,000lbs MGLW
Maintenance/Ferry Landing Fee	$1.00 per 1,000lbs MGLW
Diversion Landing Fee	$1.00 per 1,000lbs MGLW

Source/Service	Fee
Miscellaneous Aircraft Operating Fees	
City West General Aviation Ramp MGLW 0-40,000	$10.00 per aircraft
City West General Aviation Ramp MGLW 40,001-100,000	$20.00 per aircraft
City West General Aviation Ramp MGLW 100,001-150,000	$25.00 per aircraft
City West General Aviation Ramp MGLW 150,001-200,000	$30.00 per aircraft
City West General Aviation Ramp MGLW 200,001-Greater	$50.00 per aircraft
Ground Power	$50.00 per day
Terminal North, East, West Apron & Taxiway Parking for < 3 hours on City Ramp	$69.00 per aircraft
Terminal North, East, West Apron & Taxiway Parking for > 3 hours on City Ramp	$138.00 per aircraft, per day
Scheduled Non-Preferential Gate and Bridge Usage	$64.00 per use
Itinerant Non-Preferential Gate and Bridge Usage	$65.00 per use
City Ramp Parking < 3 hours and Gate Usage (Enplane/Deplane) – Scheduled Carriers	$120.00 per aircraft, per use
City Ramp Parking < 3 hours and Gate Usage (Enplane/Deplane) – Itinerant Carriers	$121.00 per aircraft, per use
City Ramp Parking > 3 hours and Gate Usage (Enplane/Deplane) – Scheduled Carriers	$189.00 per aircraft, per use
City Ramp Parking > 3 hours and Gate Usage (Enplane/Deplane) – Itinerant Carriers	$190.00 per aircraft, per use
Fuel Flowage Fee	$0.06 per gallon
Terminal Building Fees	
Signatory Operating Fees	
Terminal Fee	$36.07 per square foot, annually
Loading Bridge Fee	$6,933 annually
Dual Operation Parking Position	$5,199 annually
Non-Signatory Scheduled Fees	
Terminal Fee	$45.09 per square foot, annually
Small 300 square foot Ticket Counter	$5.00 per enplaned operation
Large 600 square foot Ticket Counter	$9.00 per enplaned operation
Small 800 square foot Baggage Makeup	$12.00 per enplaned operation
Large 1,300 square foot Baggage Makeup	$20.00 per enplaned operation
Small Ticket Counter & Bag Makeup	$17.00 per enplaned operation
Large Ticket Counter & Bag Makeup	$29.00 per enplaned operation
Non-Signatory Itinerant Fees	
Joint Use	$2.21 per enplanement
Small 300 square foot Ticket Counter	$6.00 per enplaned operation
Large 600 square foot Ticket Counter	$11.00 per enplaned operation
Small 800 square foot Baggage Makeup	$15.00 per enplaned operation
Large 1,300 square foot Baggage Makeup	$24.00 per enplaned operation
Small Ticket Counter & Bag Makeup	$21.00 per enplaned operation
Large Ticket Counter & Bag Makeup	$35.00 per enplaned operation
Miscellaneous Rates and Charges	
FedEx Glycol Dump	$123.71 monthly
Unimproved Ground Rent	$0.21 per square foot

Source/Service	Fee
Improved Ground Rent	$0.44 per square foot
Terminal Rent (Non-Airline)	$45.09 per square foot, annually
Ramp Space	$0.90 per square foot, annually
Delta Cargo Bay	$19.74 per square foot, annually
New User Cargo Bay	$19.82 per square foot, annually
GA Operator Permit	$10.00 annually
Newspaper Permit	$16.00 per location, monthly
Standard Cable TV Connection	$36.23 per hookup
Cable TV Installation	$160.00 per instance
Telephone	
2 button (display)	$3.70 per device
2 button (New 2012)	$4.70 per device
2 button (non-display)	$3.80 per device
4 button (display)	$4.90 per device
6 button (New 2012)	$4.80 per device
8 button (display)	$5.70 per device
8 button (non-display)	$3.90 per device
12 button (New 2012)	$5.60 per device
16 button	$6.30 per device
Analog – NEC	$1.50 per device
Analog – Wall Phone	$1.50 per device
Analogs in stock (from 2001)	$1.50 per device
Telephone Cable only	$6.37 per cable
Telephone extension	$6.90 per extension

Source: Colorado Springs Airport, 2021

Airport Role

Airports can play a variety of different functional roles and contribute at varying levels to meeting the transportation and economic needs on national, regional, state and local levels. Identifying and understanding the various roles that an airport plays is essential so that facilities and services can be developed appropriately to fulfill that airport's respective roles. **Table 2-4** lists the Colorado Springs Airport's various role classifications.

Table 2-4: COS Airport Roles

Role Identification Source	Role
National Plan of Integrated Airport Systems 2021-2025	Primary—Small Hub
2020 Colorado Aviation System Plan	Commercial Service

Source: FAA, CASP

National Plan of Integrated Airport Systems (NPIAS)

The NPIAS is an FAA-sponsored national airport system plan whose purpose is to identify those airports considered important to the national air transportation system, and to understand how those airports currently operate within the

system. An airport identified within NPIAS is eligible for grants under the AIP for the planning and implementation of airport capital improvements and infrastructure development. In practice, those airports included in the NPIAS are assigned a specific service level or role based on the services provided to host communities. These service levels or roles also help define the AIP funding categories established by Congress to assist in the distribution of financial resources for airport development.

The 2021 NPIAS classified Colorado Springs Airport as a Primary—Small Hub airport. This Primary airport category is defined by the FAA as public airports receiving scheduled air carrier service with 10,000 or more enplaned passengers per year. There are four sub-categories within the Primary category: Large Hub, Medium Hub, Small Hub, and Nonhub. Small Hubs are defined as airports that account for 0.05 percent to 0.25 percent of total U.S. passengers.

2020 Colorado Aviation System Plan (CASP)

The 2020 CASP is a strategic analysis of the statewide system of public-use airports conducted by the CDOT Division of Aeronautics. The CASP produced both an extensive assessment of the current state airport system's condition, and a guide for meeting its current and future needs. This plan provides tools to facilitate the continued successful development of the statewide aviation system, to respond to its future challenges, and to meet changes in demand to promote system sustainability. This plan also identifies roles for each public-use airport in the state.

Colorado Springs Airport is currently classified in the CASP as a Commercial Service airport, which is defined in the study as follows:

> *[A Commercial Service airport] has scheduled commercial air carrier service and provides access to large metropolitan areas around the country. These airports receive higher levels of activity from a wide variety of aircraft and airport users. Commercial Service airports often serve as gateways for interstate and international travelers and host many aviation- and non-aviation-related businesses that support the local community.*

Primary Airport Data

Table 2-5 below summarizes some of the important primary data elements for the Colorado Springs Airport.

Table 2-5: COS Primary Data – Existing Conditions

Colorado Springs Airport (COS) - Primary Airport Data	
Associated Town	Colorado Springs, CO
Airport Owner / Sponsor	City of Colorado Springs (Public)
Airport Management	Director of Aviation
Airport Advisory Commission	Seven members
Airport Roles	FAA NPIAS: Primary – Small Hub

Colorado Springs Airport (COS) - Primary Airport Data	
	2020 CASP: Commercial Service
Commercial Air Service Providers	American Airlines, Delta Air Lines, Frontier Airlines, Southwest Airlines, United Airlines
Air Traffic Control Tower (ATCT)	Hours of Operation: 24/7
Part 139 Classification	Class I
Aircraft Rescue and Fire Fighting (ARFF) Index	C
Airport Acreage	7,444 acres
Airport Reference Point (ARP)	38° 48' 20.9270" N 104° 42' 02.7890" W
Airport Elevation	6,187 Feet - Mean Sea Level
Area Mean Maximum Temperature	84.8° F
FAA Sectional Chart	Denver

Source: Jviation, a Woolpert Company, and FAA 5010

Airport Services

Airports can provide a range of services to meet the demands of its individual market. **Table 2-6** provides a general listing of Colorado Springs Airport's current range of aviation-related services and the entities that provide them.

Table 2-6: COS Aeronautical Services

Service	Provider
Fixed Base Operator (FBO) Services - Aircraft support services (e.g., fueling, deicing, oxygen, GPU, lavatory, etc.) - Passenger support services (e.g., ground transportation, catering, etc.)	Cutter Aviation, LLC Colorado jetCenter JHW Hangar Complex
Flight Training	Arapahoe Flight Club Direct Connect Flight Academy (DCFA) Peak Aviation, ATP, Peterson Flight Club
Aircraft Management	Cutter Aviation, LLC Eclipse Management, LLC
Aircraft Maintenance	Arapahoe Flight Club Cutter Aviation, LLC D&J Aviation, Inc. Grand Aviation Businesses JC Aviation, LLC Rampart Aviation, LLC Trine Aerospace, LLC
Aircraft Parking (based/transient) – Tie Downs & Hangars	Cutter Aviation, LLC Colorado jetCenter Five Star Aviation LLC JHW Hangar Complex

Source: Colorado Springs Airport

Accident History at COS

National Transportation Safety Board (NTSB) records were examined to identify any trends in the types of accidents that have occurred over the previous 30 years. Accident history is important to recognize, especially those that might be attributable to airport design, layout, or aircraft operation. Most civilian accidents

or incidents (no injuries) at COS are typical of most CS airports (e.g., during landings). Based on a review of accident reports, presented in **Table 2-7** there were no accidents that were attributed to the Airport's design or operation.

Table 2-7: NTSB Accident Reports at COS: 1991-2021

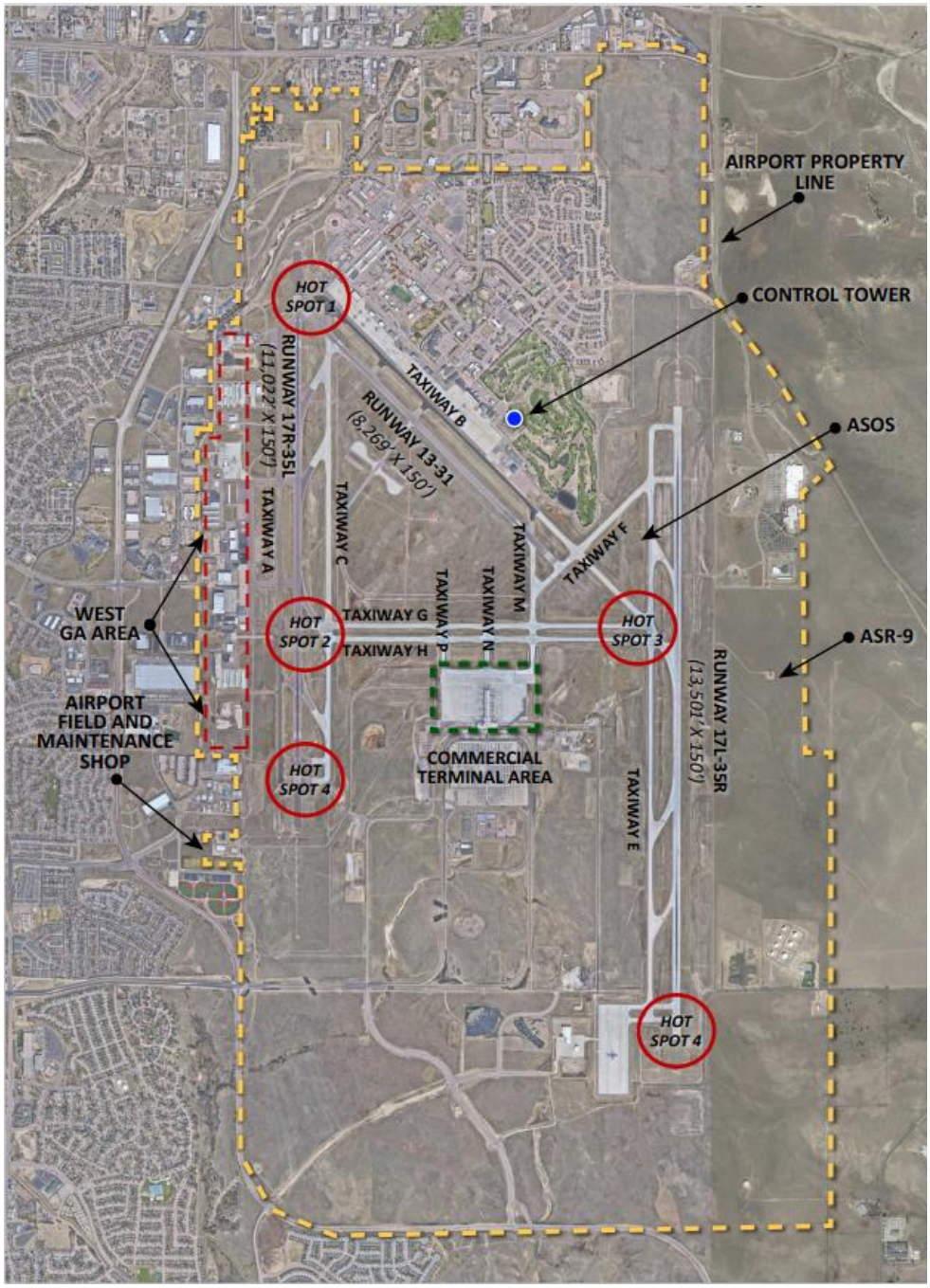
Date	Aircraft Type	Injuries/Fatalities
3/3/1991	Boeing 737-200	Fatal (25)
10/18/1992	Cessna 172	Non-Fatal
10/15/1993	Cessna 172F	Non-Fatal
1/13/1994	Bellanca 8KCAB-180	Non-Fatal
10/29/1994	Cessna 172P	Non-Fatal
9/01/1995	Cessna 172N	Non-Fatal
4/23/1996	Cessna 172P	Non-Fatal
10/04/1996	Cessna 152	Non-Fatal
4/16/1997	Boeing 737-300	Incident
8/05/1997	Beech 58P	Fatal (2)
12/21/1997	Beech A100	Fatal (2)
2/11/1998	Beech 23	Non-Fatal
2/16/1999	Piper PA-28-180	Non-Fatal
1/30/2001	Cessna R172E	Non-Fatal
10/08/2001	Cessna 172N	Non-Fatal
3/09/2003	Mooney M20C	Non-Fatal
5/23/2003	Mooney M20K	Non-Fatal
4/17/2004	Canadair CL-600-2B19	Incident
9/04/2004	Gates Learjet 25B	Non-Fatal
6/11/2005	Beech S35	Non-Fatal
6/22/2006	Excel Jet Sport Jet	Non-Fatal
9/13/2006	Piper PA-46T-350P	Non-Fatal
12/15/2006	Boeing 737-824	Incident
7/23/2009	Piper PA-32R	Non-Fatal
9/4/2010	Beech E-90	Non-Fatal
12/19/2011	Mooney M20E	Fatal (2)
4/3/2011	Cessna 172N	Non-Fatal
2/4/2012	Cessna R182	Minor Injury
7/19/2012	Cessna T210M	Non-Fatal
4/21/2013	Cessna T182T	Non-Fatal
9/4/2013	Cessna T207	Minor Injury
11/28/2014	American Champion Aircraft 7EC	Non-Fatal
11/9/2015	Cirrus SR22	Fatal (2)
3/18/2017	Cessna R182	Non-Fatal
8/3/2017	Beech D17S	Non-Fatal
4/15/2018	Cessna T210N	Minor Injury
9/11/2019	Piper PA-28	Non-Fatal
4/15/2021	LearJet 35A	Non-Fatal

Source: NTSB

Airside Facilities

Airside facilities are the portions of the Airport that accommodate the movement of aircraft and encompass runways, taxiways, and other facilities necessary to support flight activity. **Figure 2-3** depicts some of COS's existing airside facilities.

Figure 2-3: COS Airside Facilities



Source: Jviation, a Woolpert Company

Runways

Colorado Springs Airport is comprised of three runways: two north/south parallel runways (Runway 17L-35R with a concrete surface and Runway 17R-35L with a paved asphalt surface) and one southwest/northwest runway (Runway 13-31 with a paved asphalt surface) that serves as the secondary or crosswind runway. All runway ends except for Runway 13 are served by an instrument approach procedure. Each runway has a full parallel taxiway and connecting taxiways that provide aircraft access to the various ramp areas and other facilities on the Airport. **Table 2-8** provides additional details about the runways at COS.

Table 2-8: COS Runway Data

	Runway 17L-35R	Runway 17R-35L	Runway 13-31
Dimensions	13,501 ft x 150 ft	11,022 ft x 150 ft	8,269 ft x 150 ft
Runway Surface Type	Concrete – Grooved	Asphalt – Grooved	Asphalt – Grooved
Pavement Condition	Good	Good	Good
Runway End Location	(17L) 38° 48' 57.9122" N 104° 41' 08.6418" W (35R) 38° 46' 44.4700" N 104° 41' 08.8697" W	(17R) 38° 49' 26.6740" N 104° 42' 57.2254" W (35L) 38° 47' 37.7637" N 104° 42' 57.3636" W	(13) 38° 49' 23.3600" N 104° 42' 55.2700" W (31) 38° 48' 25.4900" N 104° 41' 41.5300" W
Runway End Elevations	(17L) 6,187.1 MSL (35R) 6,102.9 MSL	(17R) 6,176.6 MSL (35L) 6,045.2 MSL	(13) 6,173.2 MSL (31) 6,137.2 MSL
Effective Gradient	(17L) -0.62% (35R) 0.62%	(17R) -1.2% (35L) 1.2%	(13) -0.4% (31) 0.4%
Runway Markings	Precision Instrument	Precision Instrument	Non-Precision Instrument
Pavement Classification Number	95 /R/B/W/T	99 /F/B/X/T	48 /F/C/X/T
Runway Strength	Single Wheel – 120,000 lbs. Dual Wheel – 250,000 lbs. Double Tandem Wheels – 550,000 lbs. Dual Double Tandem – 1,120,000 lbs.	Single Wheel – 120,000 lbs. Dual Wheel – 250,000 lbs. Double Tandem Wheels – 550,000 lbs. Dual Double Tandem – 1,120,000 lbs.	Single Wheel – 120,000 lbs. Dual Wheel – 171,000 lbs. Double Tandem Wheels – 279,000 lbs. Dual Double Tandem – 691,000 lbs.
Threshold Displacement	(17L) 0 ft (35R) 0 ft	(17R) 0 ft (35L) 0 ft	(13) 0 ft (31) 356 ft
Visual Approach Slope Indicator (VGSI)	(17L) Prec. Approach Path Indicator (35R) Prec. Approach Path Indicator	(17R) Prec. Approach Path Indicator (35L) Prec. Approach Path Indicator	(13) Prec. Approach Path Indicator (31) Prec. Approach Path Indicator
Edge Lighting	HIRL	HIRL	MIRL
Approach Lighting	(17L) MALSR (35R) NA	(17R) NA (35L) MALSR	(13) NA (31) NA
Other Runway Lighting	(17L) NA (35R) REILs	(17R) REILs (35L) NA	(13) REILs (31) REILs
Runway Design Code (RDC)	C-IV	C-IV	C-IV
Critical Aircraft	B757-200	B757-200	C130

Source: FAA 5010, 2018 COS Airport Layout Plan

Taxiways

Taxiways are paved areas used by airplanes to move from one part of an airfield to another. A taxiway's primary function is to provide access between terminal/hangar facilities and the runways. There are two general types of taxiways: parallel and connector. Taxiways that are located parallel to runways generally provide a route for aircraft to reach a runway end. Connector taxiways, which can connect runways to parallel taxiways, provide paths for aircraft to enter the runway for departure or leave the runway after landing. Some connector taxiways are at a right angle to the runway while others are at an acute angle to provide high-speed accessibility. Connector taxiways also provide a means for aircraft to move among the various airside components of an airport including aircraft hangar and storage areas, fueling area, and aircraft parking and aprons. Note that taxiways are generally identified by letters.

COS has a comprehensive taxiway system that meets taxiway design group 5 standards and provides access between the three main ramp areas and the three runways. The taxiway system is shown in **Figure 2-3** and detailed information about each taxiway is below in **Table 2-9**.

Table 2-9: COS Taxiway Details

Taxiway ID	Type	Width	Condition
A	Full Parallel	75 ft	Good/Satisfactory/Very Poor
B	Full Parallel	75 ft	Fair/Poor
C	Full Parallel	75 ft	Good/Satisfactory
E	Full Parallel	75 ft	Good/Satisfactory
F	Connector	75 ft	Good/Fair
G	Connector	75 ft	Good
H	Connector	75 ft	Good/Satisfactory
M	Connector	100 ft	Good
N	Connector	100 ft	Good
P	Connector	100 ft	Good

Source: 2018 APMS, 2018 Airport Layout Plan

It is important to recognize that COS has four "hot spots." The FAA defines hot spots as problematic areas (as it relates to runway safety) that present increased risk to aircraft during surface operations. Typically, a hot spot is a complex or confusing taxiway/taxiway or taxiway/runway intersection. The area of increased risk has either a history of, or potential for, runway incursions or surface incidents due to a variety of causes, such as airport layout, traffic flow, airport marking, signage and lighting, situational awareness, and training. Hot spots are depicted on airport diagrams until such time the increased risk has been reduced or eliminated. Following are the four COS hot spots as defined by FAA (see also **Figure 2-3** for their specific locations):

- *Hot Spot 1 (HS 1) Runway threshold 13 and 17R are next to each other; wrong runway departure and landing potential. Runway 17R connector Taxiway B1; tower line of sight limited. Maintain close communication with ATCT when in this area.*
- *Hot Spot 2 (HS 2) Intersection of Taxiway A4 and Taxiway G at Runway 17R-35L: "High volume" crossing point.*
- *Hot Spot 3 (HS 3) Large concrete area at the intersection of Taxiway E4, Taxiway G, Taxiway H and Taxiway E. High risk of entering wrong taxiway.*
- *Hot Spot 4 (HS 4) The approach ends of Runway 35R and Runway 35L are very far from the control tower. Small aircraft may not be readily visible to the controller. Maintain strict communication with ATCT when in this area.*[2]

Aprons

An aircraft apron is used for aircraft movement, positioning, storage, tiedowns, and fueling, and vehicle movement and parking. COS has aircraft apron areas on the south (commercial terminal area), on the west (general aviation/air cargo area), and the north (military area) sides of the Airport. Approximate paved areas for each of the aprons include 1.9 million square feet on the south apron, 580,000 square feet on the west apron, and 2.5 million square feet on the north apron. The south apron, which accommodates aircraft serving the commercial airline terminal, can currently accommodate 12 narrowbody jet aircraft at existing gates, with additional parking space for another 16 narrowbody jets not at gates. The north apron near Peterson Space Force Base is only for military aircraft use.

With respect to the general aviation apron, it should be noted that transient general aviation aircraft typically prefer power-in/power-out parking versus nested tiedowns that requires physically moving (e.g., by hand or by tug) an aircraft into and out of each parking position. Power-in/power-out parking requires more space on an apron than nested tiedowns due to the need for additional taxilanes and space between aircraft parking spots. COS has both types of aircraft parking available.

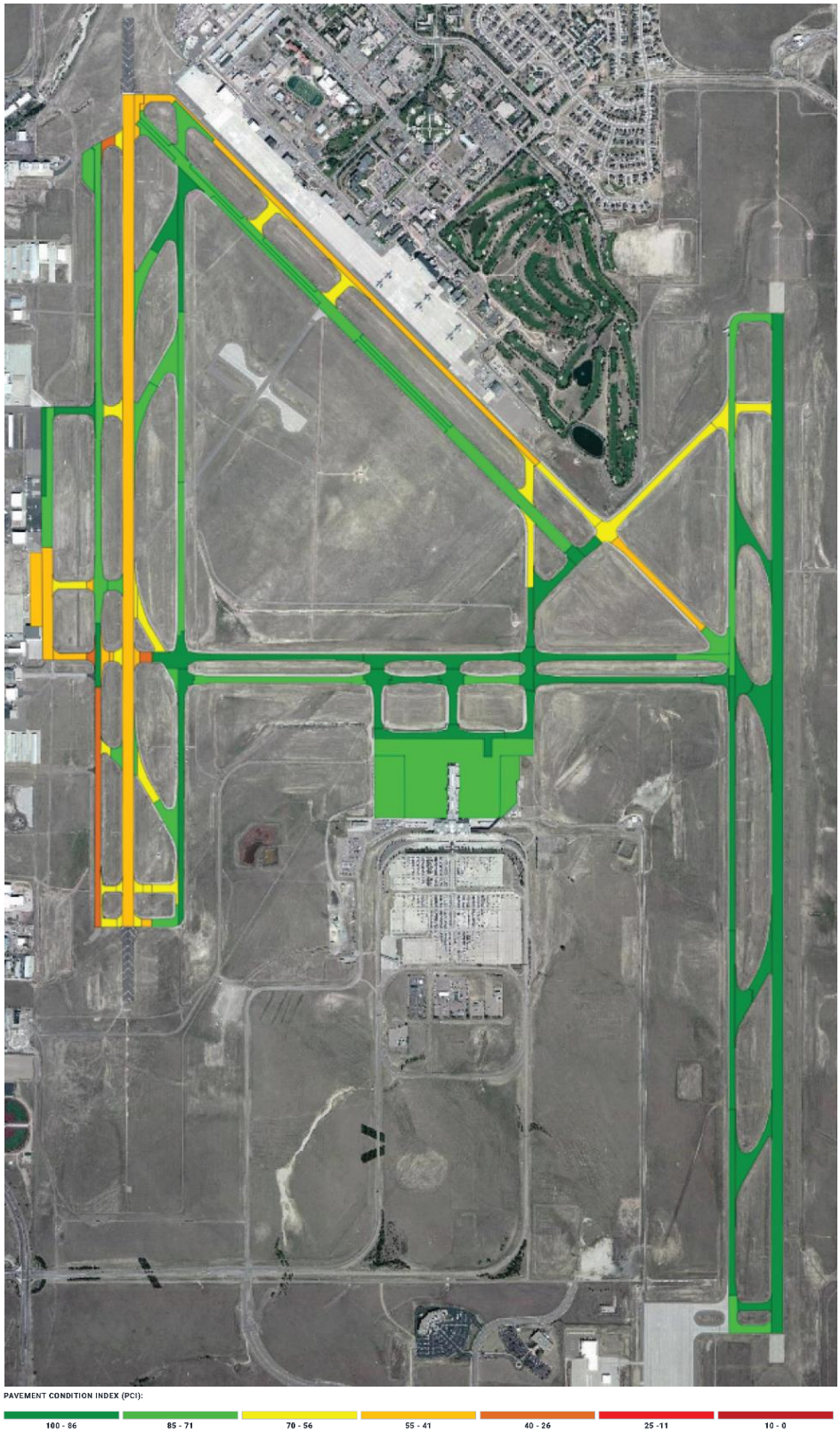
Pavement Condition

FAA AC 150/5380-6B, *Guidelines and Procedures for Maintenance of Airport Pavements*, recommends a detailed pavement inspection that follows the American Society for Testing and Materials (ASTM) D5340, *Standard Test Method for Airport Pavement Condition Index Surveys*. A detailed pavement inspection employs a visual rating system for pavement distress. The condition and strength values are summarized in the Pavement Condition Index (PCI). The PCI scale ranges from a value of zero (representing a pavement in failed condition) to a value of 100 (representing a pavement in excellent condition).

[2] FAA Runway Safety - Hot Spots List

The CDOT Division of Aeronautics 2020 Airport Pavement Management System (APMS) shows that the pavement surfaces at COS range from a PCI of 85-100 (good) to 26-40 (very poor). **Figure 2-4** illustrates the PCI of pavement at COS following a 2018 inspection. COS's overall airfield pavement is considered to be in "satisfactory" condition with a weighted airport PCI of 77. COS's lowest PCI values, indicating pavement in "very poor" condition, are limited to a relatively small area dedicated to parallel taxiways and connectors. It should be noted that Runway 17R/35L was overlaid in 2021, which is not reflected in this graphic.

Figure 2-4: Pavement Condition Index Map



Source: Applied Pavement Technology, CDOT Division of Aeronautics

Airfield Lighting

Airport Identification Lighting

A rotating beacon identifies the location of the Airport at night and during periods of poor visibility. This beacon projects alternating green and white beams from dusk to dawn. When activated during daylight hours, the beacon signals Instrument Flight Rule (IFR) conditions. The COS rotating beacon is located on the airfield, next to the electrical vault and Taxiway M.

Runway Lighting

Runway lighting aids are necessary to provide pilots with critical takeoff and landing information concerning runway alignment, lateral displacement, rollout operations, and runway distance remaining. COS's existing runway lighting capabilities are detailed in **Table 2-10**.

Runway edge lights are used to outline the edges of runways during periods of darkness or restricted visibility conditions. Both Runway 17L-35R and Runway 17R-35L are outfitted with High Intensity Runway Lights (HIRL), while Runway 13-31 is equipped with Medium Intensity Runway Lights (MIRL).

A Precision Approach Path Indicator (PAPI) is a series of lights that provide visual guidance during a runway approach. Four-light PAPI systems are installed on all six runway ends. Additionally, Runway 17L and Runway 35L are equipped with a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). Note that approach light systems are designed to provide pilots with the basic means of transitioning from instrument flight to visual flight during landing.

Runway End Identifier Lights (REILs) are high intensity white strobe lights located on each side of the runway threshold to enable rapid identification of the runway threshold, particularly at night and during periods of poor visibility. Runway 35R, Runway 17R, Runway 13, and Runway 31 are equipped with REILs.

Table 2-10: COS Runway Lighting

Lighting	Runway 17L	Runway 35R	Runway 17R	Runway 35L	Runway 13	Runway 31
Approach Lighting	MALSR	-	-	MALSR	-	-
Runway Edge Lighting	HIRL	HIRL	HIRL	HIRL	MIRL	MIRL
Centerline Lights	Yes	Yes	-	-	-	-
Visual Approach Slope Indicator (VGSI)	PAPI	PAPI	PAPI	PAPI	PAPI	PAPI
Other Lighting	-	REIL	REIL	-	REIL	REIL

Source: FAA 5010

Taxiway Lighting

Taxiway lights provide visual guidance to pilots and ground service/maintenance vehicles accessing the taxiway at night or in low visibility conditions. COS has Medium Intensity Taxiway Light (MITL) systems installed along the edge of all taxiways to guide aircraft between the runway to the apron areas.

Other Visual Aids

Additional visual aids and instrumentation at COS assist pilots in arriving or departing. The Airport's integrated wind cone provides pilots with traffic pattern and wind direction/velocity information. This equipment is located near the central area of the airfield, just west of Taxiway M and south of Runway 31.

Signage provides guidance and identifies essential facilities and locations on an airport. Airfield signage gives pilots visual guidance information for all phases of movement on the airfield. COS is equipped with FAA-compliant signs that include instruction, location, direction, destination, and information signs.

Automated Terminal Information System (ATIS) and Automated Surface Observation System (ASOS)

The Airport maintains an Automatic Terminal Information System (ATIS), which includes weather information provided by an Automated Surface Observing Systems (ASOS) program. The ASOS is owned and maintained by the FAA, and serves as the nation's primary surface weather observation network. It is designed to facilitate weather forecast activities and aviation operations while supporting the needs of the meteorological, hydrological, and climatological research communities. The ASOS at COS is located in the northeast portion of the airfield, just west of Taxiway E and south of Taxiway F. The system provides on-site weather data collection and reporting capabilities. The ATIS transmits the airport name, a phonetic letter code, weather data, and other remarks to pilots on a frequency of 125.0 MHz and is also available by telephone (719-380-6748).

Landside Facilities

Landside development at the Airport is generally divided into three primary development areas, located on the west, the south, and the east sides. These areas are all in different stages of development, each with unique attributes and intended users. The west side area features existing general aviation and air cargo facilities; the south side features current aviation-related business tenants and the Peak Innovation Park; and the east side features greenfield development opportunities with limited existing improvements. Separately, Peterson SFB operates on the north side of the Airport and occupies all landside development area in that area.

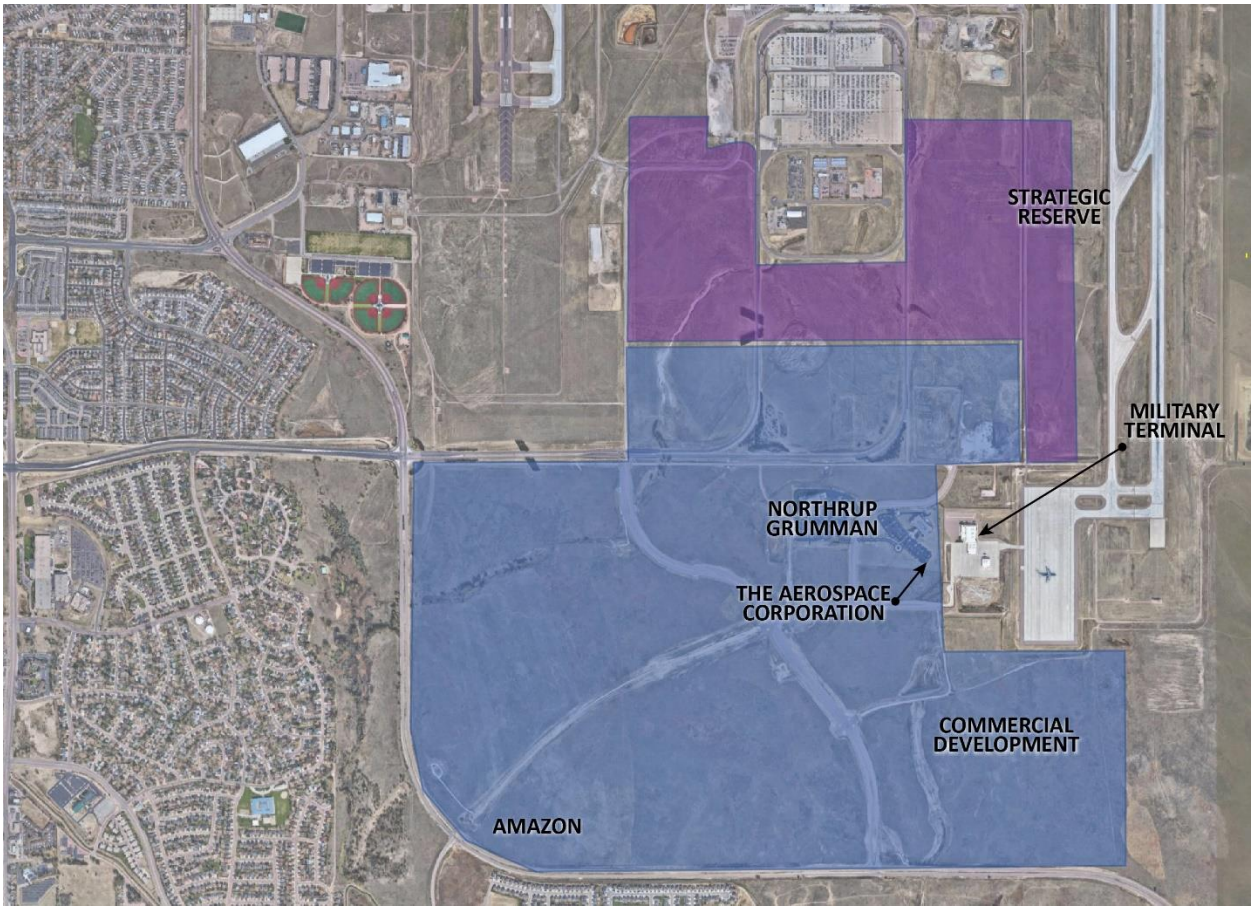
COS's Development Areas are represented in **Figure 2-5**, **Figure 2-6**, and **Figure 2-7** and are described in the following sections.

Figure 2-5: COS West Side Development Area

Source: Jviation, a Woolpert Company

Development on the west side of the airport consists primarily of aircraft hangars, airport-reliant businesses, and air cargo facilities. Construction of buildings and access has occurred over many years, often in an ad hoc manner, as is typical at most airports.

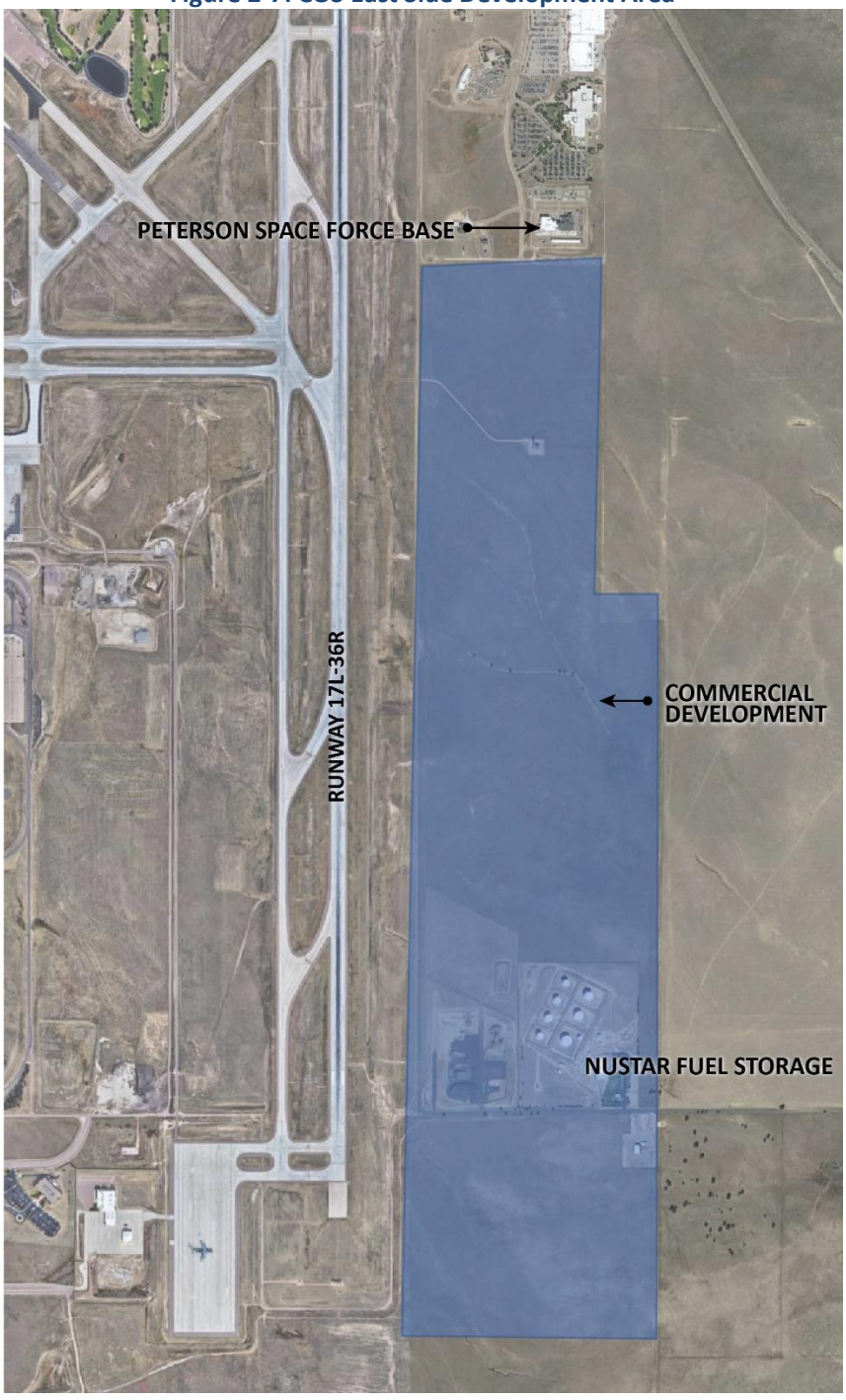
Figure 2-6: COS South Side Development Area



Source: Jviation, a Woolpert Company

The Peak Innovation Park occupies most of the south side development area. The Park provides greenfield construction opportunities for businesses to locate near the Airport. This portion of airport property does not have direct access to the airfield and is primarily directed at aviation-adjacent businesses including defense contractors, hotels, and logistics companies.

Figure 2-7: COS East Side Development Area



Source: Jviation, a Woolpert Company

The east side development area has experienced little development to date. The northern section of this site contains parcels supporting Peterson SFB and a section dedicated to fuel storage for the Airport and the region. There remains a large amount of undeveloped land available for new aviation-related construction and/or non-aeronautical development.

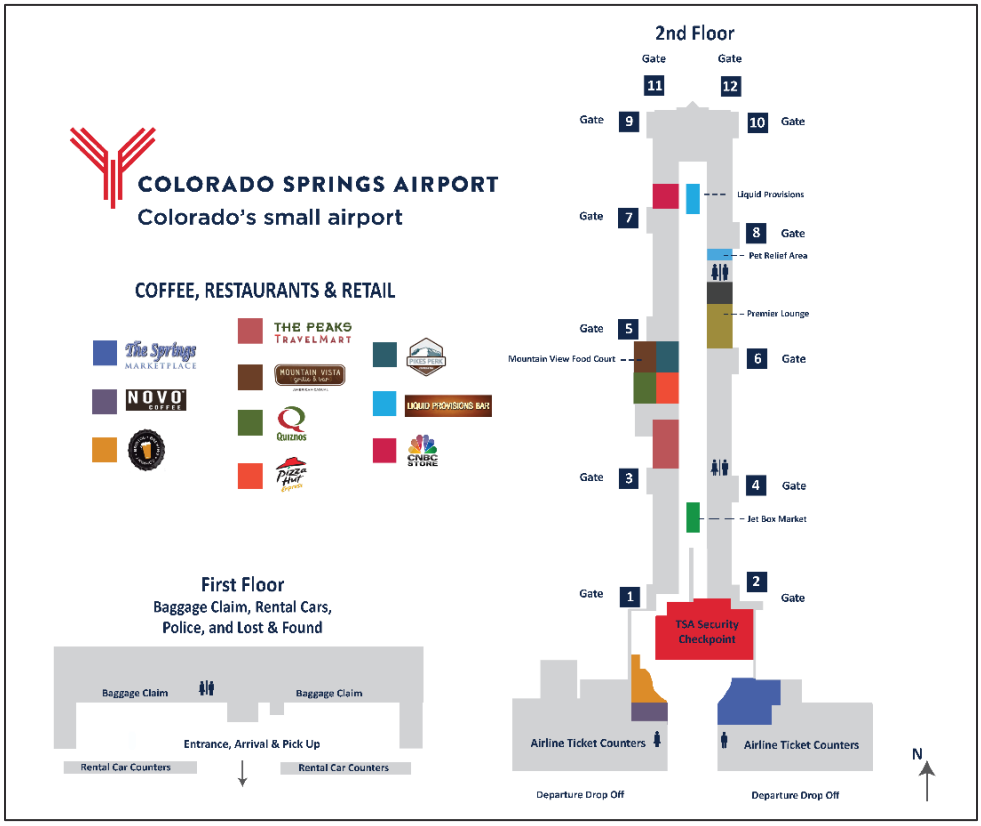
Commercial Terminal Building

Constructed in 1994, the Colorado Springs Airport's commercial terminal building has three levels and a total of approximately 314,000 square feet. An eastern branch of the terminal was constructed in 1996 but (East Terminal Unit – ETU) is now primarily used for other purposes.

The second floor of the main passenger terminal is the departures level and accommodates airline ticket counters and offices, as well as concessions including a retail facility and two restaurants. Other departure level areas include the TSA screening facility, departure hold rooms, airport administrative offices, building operations and storage, and restrooms. The arrivals level is located on the first floor and includes the baggage claim lobby and rental car counters for Alamo, Avis, Budget, Enterprise, Hertz, and National. The third floor is primarily dedicated to airport administrative offices.

The main terminal concourse has 12 aircraft gates with passenger boarding bridges. As of October 2021, five airlines operate at the Airport: American Airlines, Delta Air Lines, Frontier Airlines, Southwest Airlines, and United Airlines. Several retail and restaurant vendors currently operate within the main terminal concourse. **Figure 2-8** illustrates current concourse tenants as of October 2021, while **Table 2-11** presents the terminal's functional areas in terms of square footages.

Figure 2-8: COS Terminal Building Layout



Source: Colorado Springs Airport

Table 2-11: Commercial Terminal Areas

Functional Area	Terminal Area	Area (sq ft)
Airline Operations	Departures Level	63,900
Airline Operations	Arrivals Level	30,700
Airport Administration	Departures Level	2,800
Airport Administration	Arrivals Level	3,900
Airport Administration	3rd Floor	10,500
Baggage Claim	Arrivals Level	15,300
Baggage Handling	Arrivals Level	21,100
Building Operations	Departures Level	5,800
Building Operations	Arrivals Level	27,400
Building Operations	3rd Floor	3,500
Concession	Departures Level	19,700
Concession	Arrivals Level	3,700
TSA	Departures Level	4,700
TSA	Arrivals Level	4,200
Public Space/Circulation	Departures Level	73,600
Public Space/Circulation	Arrivals Level	23,400

Source: Colorado Springs Airport
*Departures Level includes East Terminal space.

Airport Traffic Control Tower (ATCT)

The COS Airport Traffic Control Tower (ATCT) is an FAA facility that operates continuously on a 24-hour schedule. The tower is centrally located on the airfield, just north of Runway 13-31 within the boundary of Peterson SFB.

Aircraft Rescue and Fire Fighting Facilities (ARFF)

COS has two Aircraft Rescue and Fire Fighting (ARFF) facilities, both of which are located within the boundary of Peterson SFB and are operated by the U.S. Space Force. Services provided by the facilities include first response medical emergency support, aircraft crash rescue capabilities, and structural and brush fire support. The ARFF has an FAA Index C classification, which is appropriate for an airport with regular operations by aircraft having lengths of 158 feet or less.

Airport Buildings and Hangars

COS has a wide variety of buildings located on the Airport that serve a range of purposes. Many of the structures on the Airport are related to air cargo, general aviation, commercial air service, or military applications. Note that many of these buildings are aircraft hangars (enclosed structures for the parking, servicing, and maintenance of aircraft) designed to protect aircraft from adverse weather conditions such as wind, snow, hail, ice, sun, and rain. COS currently has nearly 615,000 square feet of hangar space (e.g., corporate hangars, box hangars, and T-hangars), with other structures being utilized for purposes not dedicated to aircraft storage (e.g., office, general storage, business areas, etc.). See **Table 2-12** for a listing of COS buildings and hangars, and **Figure 2-9** for their locations. All hangars are privately-owned but lease their land from the Airport.

There are currently two hangars supporting airline maintenance: a 100,000 square-foot hangar facility for SkyWest Airlines and a 23,300 square-foot hangar for other airlines. Both facilities are located on the west side of the Airport.

The Airport's aircraft hangars are classified as either T-hangars or box (or conventional) hangars. T-hangars are a series of interconnected hangars with footprints in the shape of a "T" that can store one single- or multi-engine aircraft in each unit. COS currently has four T-hangar structures (a total of 294,400 square feet) that have space to accommodate a total of 175 aircraft. Box hangars, also known as conventional or corporate hangars, have a square or rectangular footprint that accommodate a wide range of aircraft storage needs, from one single-engine aircraft, to multiple corporate jets. There are currently 14 box hangars (a total of 321,200 square feet) on the Airport that range in size from 10,800 to 100,000 square feet.

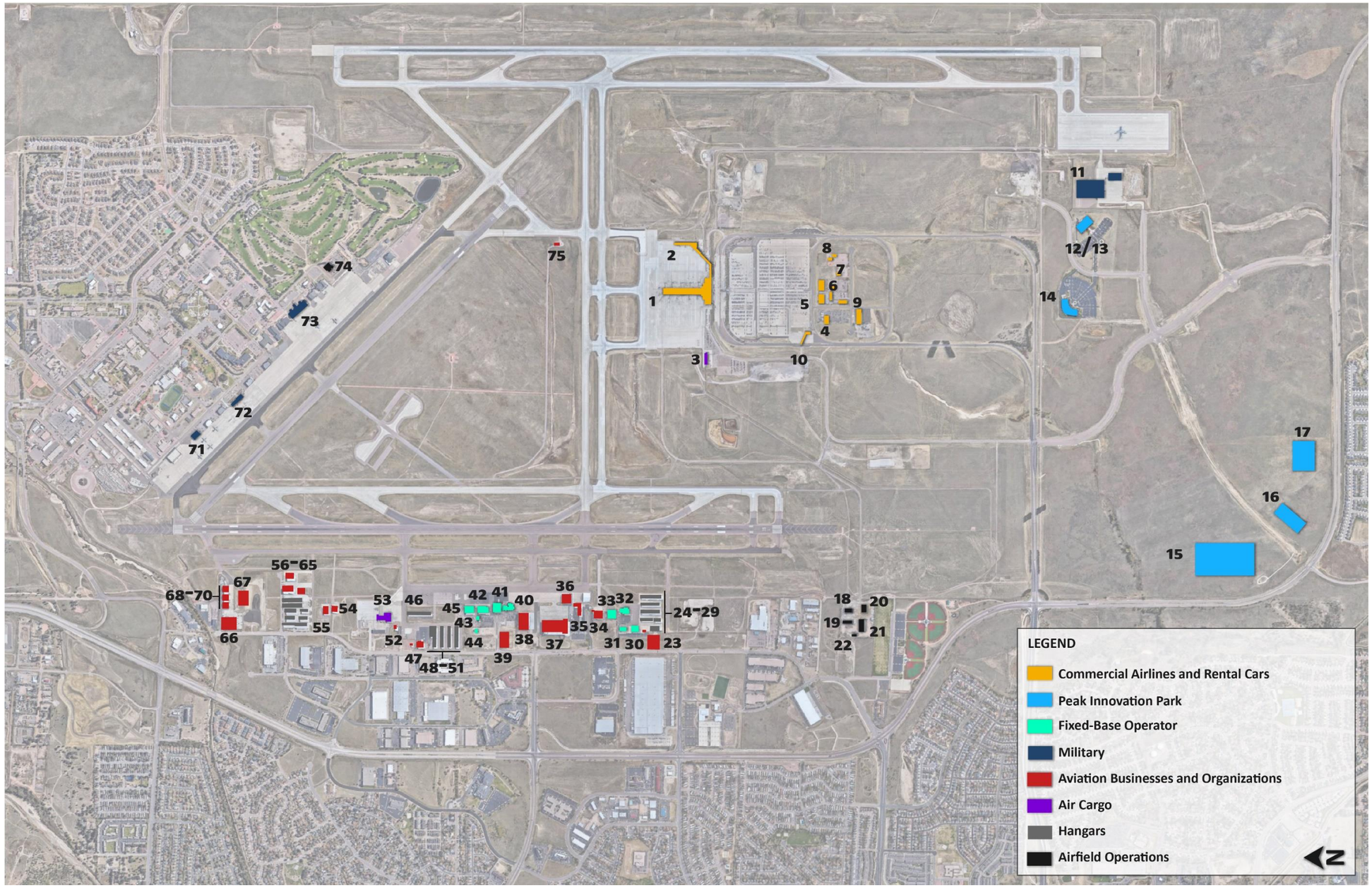
Table 2-12: Building and Hangar Data

Identification	Current Tenant(s)	Building Address
1	Passenger Terminal	7770 Milton E. Proby Pkwy
2	East Terminal Unit (ETU)	7770b Milton E Proby Pkwy
3	Air Cargo Building	2420 Peak Innovation Pkwy
4	Hertz Rental Car Service Center	7736 Milton E. Proby Pkwy
5	Avis Rental Car Service Center	7740 Milton E. Proby Pkwy
6	Vacant	7744 Milton E. Proby Pkwy
7	Enterprise Rental Car Service Center	774 Milton E. Proby Pkwy
8	Alamo/National Rental Car Service Center	7752 Milton E. Proby Pkwy
9	Vacant	7704 Milton E. Proby Pkwy
10	Toll Plaza	7760 Milton E. Proby Pkwy
11	A/DACG Facility	7330 Embraer Heights
12	Aerospace	7250 Getting Heights
13	Aerospace	7246 Getting Heights
14	Northrop Grumman	3535 Northrop Grumman Point
15	Amazon	4222 Integration Loop
16	Amazon	4303 Grinnell Blvd.
17	Amazon	4333 Integration Loop
18	Airfield Maintenance Facility, Building A	5750 Milton E. Proby Pkwy
19	Airfield Maintenance Facility, Building B	5730 Milton E. Proby Pkwy
20	Airfield Maintenance Facility, Building C	5710 Milton E. Proby Pkwy
21	Airfield Maintenance Facility, Building D	5720 Milton E. Proby Pkwy
22	Airfield Maintenance Facility, Storage Building	5740 Milton E. Proby Pkwy
23	Sierra Nevada Corporation	2121 Aviation Way
24	JHW Investment Company	2049 Aviation Way
25	JHW T-Hangars	2143 Aviation Way
26	JHW T-Hangars	2147 Aviation Way
27	JHW T-Hangars	2149 Aviation Way
28	JHW T-Hangars	2151 Aviation Way
29	JHW T-Hangars	2153 Aviation Way
30	JHW Hangar	1947 Aviation Way

Identification	Current Tenant(s)	Building Address
31	JHW Hangar	N/A
32	JHW Investment Company (Rampart Aviation)	1777 Aviation Way
33	JHW Investment Company (Rampart Aviation)	1727 Aviation Way
34	Cordillera Corporation	1719 Aviation Way
35	Sierra Nevada Corporation	1711 Aviation Way
36	Sierra Nevada Corporation	1707 Aviation Way
37	Skywest Airlines Maintenance Facility	1697 Aviation Way
38	Sierra Nevada Corporation	5751 Camber View
39	Sierra Nevada Corporation	5723 Camber View
40	Cutter Aviation	5763 Camber View
41	Cutter Aviation Hangar	5771 Camber View
42	Colorado jetCenter	1575 Aviation Way
43	Colorado jetCenter Storage Building	N/A
44	Pump House	N/A
45	Colorado jetCenter Hangar	N/A
46	Colorado jetCenter T-Hangars	N/A
47	Five Star Aviation	1360 Aviation Way
48	Five Star Aviation T-Hangars A	N/A
49	Five Star Aviation T-Hangars B	N/A
50	Five Star Aviation T-Hangars C	N/A
51	Five Star Aviation T-Hangars D	N/A
52	Colorado Division of Wildlife Hangar	1280 Aviation Way
53	FedEx	1245 Aviation Way
54	JC Aviation (Direct Connect Flight Academy)	1055 Aviation Way
55	Colorado Springs Police Department Hangar	950 Aviation Way
56	COS Owners Association	905 Aviation Way
57	COS Owners Association Hangar	5705 Taxi Way
58	COS Owners Association Hangar	5715 Taxi Way
59	COS Owners Association Hangar	5725 Taxi Way
60	COS Owners Association Hangar	5735 Taxi Way
61	Eclipse Movement, LLC	5745 Taxi Way #140
62	COS Owners Association Hangar	5755 Taxi Way
63	Trine Aerospace	5765 Taxi Way
64	COS Owners Association Hangar	5775 Taxi Way
65	COS Owners Association Hangar	5795 Taxi Way
66	National Museum of WWII Aviation, Inc.	755 Aviation Way
67	National Museum of WWII Aviation, Inc.	765 Aviation Way
68	National Museum of WWII Aviation, Inc. B1	N/A
69	National Museum of WWII Aviation, Inc. B2	N/A
70	National Museum of WWII Aviation, Inc. B3	N/A
71	Peterson SFB Aero Club, H133	N/A
72	Peterson SFB, Base Operations	N/A
73	Peterson SFB, 302nd Airwing, H210	N/A
74	FAA Air Traffic Control	460 Kinchloe Loop
75	Airfield Lighting Vault	N/A

Source: Colorado Springs Airport

Figure 2-9: COS Building and Hangar Location



Source: Colorado Springs Airport; Jviation, a Woolpert Company

Fixed Base Operators (FBO)

Airports must provide a wide range of services to meet the varied demands of its individual market area. These demands are frequently accommodated by an on-airport fixed base operator (FBO) that provides a variety of aeronautical services for pilots, aircraft, and passengers. FBO services at COS are offered by three separate entities: Cutter Aviation, LLC; Colorado jetCenter; and JHW Hangar Complex. All three full-service FBOs are located on the west side of the Airport with standard business hours and after-hours capabilities. Specific services offered by the FBOs include the following:

- Aircraft fueling
- Corporate and general aviation services
- Courteous, professional line service
- Aircraft maintenance and repair (including avionics)
- Ramp side vehicle service
- Customs and immigration/foreign nationals
- On-site international regulated/garbage removal
- Heated hangars
- Aircraft parking: short and long term
- Courtesy crew car
- Ground transportation/rental cars
- Passenger and pilot lounge
- Flight planning and weather room
- Long and short-term vehicle parking
- Catering
- Hotel reservations
- Ground power units/lavatory services

Fuel and Deicing Facilities

COS's primary fuel storage facility (fuel farm) is located between the commercial terminal and Runway 17L-35R. Note that this fuel farm is directly supplied by the NuStar Terminal and Pipeline facility located in the Airport's east side development area. This facility provides fuel receiving, storage, and distribution services for the Airport and the region. **Table 2-13** and **Table 2-14** provide information on fuel storage facilities at the Airport. NuStar storage information is not included in these tables.

The west development area has separate aircraft fuel storage facilities at FBO tenant sites including Cutter Aviation, LLC; Colorado jetCenter, and the JHW Hangar Complex. There are also aircraft fuel tanks with Jet A and 100LL fuel located in the COS Business Airpark.

Fuel is delivered to all transient and based aircraft via two 3,000-gallon Jet-A fuel trucks, and two 1,000-gallon 100LL fuel trucks. Fuel services are provided during standard business hours but can be extended through advance notification.

Table 2-13: Aircraft Fuel Storage

Owner	Location	Tank Type	Fuel Type	Capacity (Gallons)	Year Installed
Colorado jetCenter	Fuel Farm	Aboveground	Jet A	50,000	1995
Colorado jetCenter	Fuel Farm	Aboveground	Jet A	50,000	1995
Colorado jetCenter	Fuel Farm	Aboveground	Jet A	50,000	1995
Colorado jetCenter	Fuel Farm	Aboveground	Jet A	50,000	1995
Colorado jetCenter	Colorado jetCenter	Aboveground	100LL	20,000	1998
Colorado Springs Police	Colorado Springs Police	Aboveground	Jet A	4,000	2001
Cutter Aviation	Cutter Aviation	Aboveground	Jet A	25,000	2016
Cutter Aviation	Cutter Aviation	Aboveground	Jet A	25,000	2016
Cutter Aviation	Cutter Aviation	Aboveground	100LL	12,000	2016
JHW Hangar	JHW Hangar	Underground	Jet A	12,000	1984
JHW Hangar	JHW Hangar	Underground	Jet A	12,000	1984
JHW Hangar	JHW Hangar	Underground	100LL	10,000	1984
COS Fuel Depot LLC	COS Business Airpark	Aboveground	100LL	12,000	2008
COS Fuel Depot LLC	COS Business Airpark	Aboveground	Jet A	12,000	2008

Source: Colorado Springs Airport

Several sites at the Airport also store fuel for vehicles and airport equipment. Most of these are located at the rental car facility while others are located elsewhere around the airfield.

Table 2-14: Equipment and Vehicle Fuel Storage

Owner	Location	Tank Type	Fuel Type	Capacity (Gallons)	Year Installed
Colorado jetCenter	Fuel Farm	Aboveground	Unleaded	10,000	1996
Alamo National	Rental Car Facility	Underground	Unleaded	12,000	1995
Avis	Rental Car Facility	Underground	Unleaded	12,000	1995
Avis	Rental Car Facility	Underground	Unleaded	12,000	1995
Hertz	Rental Car Facility	Underground	Unleaded	10,000	1994
COS Administration	Rental Car Facility	Underground	Unleaded	10,000	1994
COS Administration	Fueling Facility	Underground	Unleaded	2,000	1990
COS Administration	Fueling Facility	Underground	Diesel	10,000	1990
COS Administration	Emergency Generator	Aboveground	Diesel	2,500	1994
COS Administration	Emergency Generator	Aboveground	Diesel	2,500	1994
COS Administration	Lighting Vault	Aboveground	Diesel	1,000	1992

Source: Colorado Springs Airport

Deicing fluid is stored in three locations around the Airport, with two types of fluid in use (Type I and Type IV). Fluid is stored and distributed by Integrated Deicing Services (IDS) and Airport Terminal Services (ATS), and Southwest Airlines. **Table 2-15** lists deicing fluid storage types and capacities at COS.

Table 2-15: Deicing Fluid Storage

Owner/Location	Fluid Type	Capacity (Gallons)
IDS	Type I – Concentrate	40,000
IDS	Type I – Blended	10,000
IDS	Type IV	22,000
ATS	Type I	6,500
ATS	Type IV	5,000
Southwest Airlines	Type I	12,000
Southwest Airlines	Type IV	6,000

Source: Colorado Springs Airport

Note that fluid from the deicing process is diverted from the drainage system and stored in a glycol solution holding pond located west of the terminal area and east of the Runway 35L approach end. The solution in the holding pond is typically transferred once per year to a pretreatment pond where it is treated according to the wastewater discharge permit and discharged into the sanitary sewer.

Air Cargo

The Airport maintains two air cargo facilities: a belly cargo facility for passenger airlines and a facility capable of serving air cargo airlines. The belly cargo area is located west of the terminal facility for easy access by airline staff and ground handlers. FedEx currently occupies one of the dedicated cargo facilities and is located on the north end of the general aviation ramp area.

Non-Aviation-Related Development Areas

Airports that have properties not reasonably accessible for aviation-related purposes will often lease those properties to non-aviation-related development. This practice generates additional revenue streams for the airport and promotes financial sustainability. It is important to note that airports that have accepted federal grants through the AIP must sign grant assurances that commit the airport to developing airport properties for aviation-related purposes unless those properties are specifically released from that obligation by the FAA. Additionally, those properties may be sold or leased for FAA approved time periods, must be leased at fair market value, and income from those sales and leases must remain on the airport.

The Airport controls land as part of the 900-acre Peak Innovation Park and has sold or leased parcels to support business development that provides economic development and revenue for the Airport. The retail giant Amazon, for example, has invested millions of dollars in constructing facilities that bolster their operations in Colorado Springs.

Snow Removal Equipment (SRE) / Airfield Maintenance Structure

An airport requires a wide range of equipment to support its continued safe and efficient operations. Airfield maintenance can include grass cutting, pavement crack sealing, brush/tree removal, building maintenance, fence/gate repair, etc. Snow Removal Equipment (SRE) is specialized to quickly clear runway, taxiways, and aprons during snow events. All equipment requires regular maintenance and should be stored inside a covered facility to avoid long-term exposure to weather. A complete listing of the Airport's current SRE and select airfield maintenance equipment and age is provided in **Table 2-16**.

Additionally, COS has five separate buildings located on the southwest portion of the Airport that serve as airport vehicle maintenance and storage facilities. Collectively, these buildings comprise approximately 50,000 square feet of indoor space. There is additional outdoor space used for vehicle storage at these locations on the airfield.

Table 2-16: COS SRE/Airfield Maintenance Equipment

Year	Manufacturer	Equipment Type
Plows		
2019	Western Star	24' Root Plow
2019	Western Star	24' Root Plow
2015	Mercedes-Benz	27' Folding Plow
2013	Western Star	24' Root Plow
2013	Western Star	24' Root Plow
2013	Western Star	24' Root Plow
2013	Western Star	24' Root Plow
2013	Western Star	24' Root Plow
2011	International	24' Root Plow
2000	Sterling	22' Root Plow
2000	Sterling	22' Root Plow
2001	Oshkosh	20' Root Plow
1997	Oshkosh	20' Root Plow
1989	Oshkosh	22' Root Plow
Blowers		
2012	Oshkosh	High Speed Blower
2010	Oshkosh	High Speed Blower
1998	Oshkosh	High Speed Blower
1997	Stewart & Stevenson	High Speed Blower
Brooms		
2019	MB	22' Tow-Behind Broom
2019	MB	22' Tow-Behind Broom
2016	Overaasen	24' Tow-Behind Broom
2016	Overaasen	24' Tow-Behind Broom
2016	Overaasen	24' Tow-Behind Broom
2015	Overaasen	24' Tow-Behind Broom
2009	MB	20' Tow-Behind Broom

Year	Manufacturer	Equipment Type
2009	MB	20' Tow-Behind Broom
2009	MB	20' Tow-Behind Broom
2009	MB	20' Tow-Behind Broom
2003	MB	18' Tow-Behind Broom
2001	Oshkosh	20' Front-Mount Broom
1996	Oshkosh	20' Front-Mount Broom
Deicing Equipment		
2019	Western Star	Batts – Liquid Deicer (75' Boom)
1990	Autocar	Swenson Spreader – Solid Deicer
Miscellaneous		
2015	Halliday	Constant Friction Measuring Equipment
2012	CAT	Loader
2012	CAT	Loader

Source: Colorado Springs Airport

Airport Access Roadways and Auto Parking

Accommodations for automobile traffic and parking are important considerations for an Airport Master Plan as they facilitate ease of access for airport users and enhance the customer service experience. COS users access the commercial terminal from the south and west via Milton E. Proby Parkway while general aviation users can access the landside building via several east-west connector streets that stem from U.S. Route 24 (S Powers Boulevard). Peterson SFB consists of the entire north side of the airport property and is accessed from U.S. Route 24 to the west and north, and Marksheffel Road to the east.

The commercial terminal building parking lots accommodate approximately 5,510 public parking spaces, with 716 spaces in the short-term lot and 3,919 in the long-term lot. An overflow lot containing 875 spaces is also available.

Employees park in one of four surface lots. The East Manager Lot provides 40 spots adjacent to the terminal building and is shared by Airport staff, airlines, rental car companies, concessionaires, and public safety agencies. The West Manager Lot provides 41 spaces shared by Airport staff and tenants. The West Auxiliary Lot is just west of the West Manager Lot and provides 193 spaces and is used by Airport staff, vendors, and ground handlers. Flight crews park in the long-term parking lot.

Rental car companies use a lot directly south of the terminal area for a Ready/Return area, while rental car service areas are further south along the airport entrance road.

A cell phone lot is available to the southeast of the terminal and provides space for approximately 60 vehicles.

A Master Traffic Impact Study related to the Peak Innovation Park was completed in May 2020. The study analyzed existing and future traffic volumes on roads serving the Airport and the Park. Recommended improvements at separate

planning years (2022, 2030, and 2045) were developed for 18 intersections. As part of this Master Plan, a detailed Regional Transportation Plan for the Airport is included in the Appendices.

Fencing

Airport fencing is intended to prevent wildlife and unauthorized people from accessing airport property. COS's airfield is enclosed by an airport security fence of varying types and in various conditions. The terminal area is enclosed by an eight-foot chain link fence topped with barbed wire to enhance security near the hangars and aircraft. Aircraft aprons are accessible to pilots and tenants through controlled access system gates located at various points around the perimeter.

Peterson Space Force Base

The Airport plays a major role in military operations, as the host to Peterson Space Force Base (SFB), and its proximity to other installations in the region. Peterson SFB occupies the northern portion of the airfield near Runway 13-31 and Taxiway B. Additional facilities are located east of Runway 17L-35R, but do not have airfield access.

Peterson SFB hosts the North American Aerospace Defense Command (NORAD), the Space Force's 21st Space Wing, the Space and Missile Systems Center, the United States Northern Command (USNORTHCOM) and the 302nd Airlift Wing (Reserve). An economic impact analysis issued in 2019 estimated that the base supports over 16,000 personnel with payroll of over $570 million. Additional expenditures related to construction and operations were estimated at $534 million. Separately, the study estimated that the base supports 4,218 jobs in the community with collective annual pay of over $227 million. The total annual economic impact of the base was estimated at $1.33 billion.[3]

Arrival/Departure Airfield Control Group Facility

Located immediately west of the approach end of Runway 35R, the Arrival/Departure Airfield Control Group (A/DACG) facility was constructed in 2008 and is leased from the Airport by the Department of Defense to deploy military troops and equipment. A combination of commercial and military aircraft typically utilize the facility.

[3] Peterson AFB Complex – Economic Impact Analysis FY19

Airspace System/Navigation and Communication Aids

Colorado Springs Airport operates within the larger National Airspace System (NAS), which comprises a wide array of services, systems, and requirements for airports and pilots. The following sections provide an overview of key aspects of COS's operations within the National Airspace System (NAS).

- Air Traffic and Aviation Communications,
- the National Airspace System,
- Navigational Aids, and
- Part 77 Airspace Surfaces.

Air Traffic and Aviation Communications

Within the continental United States, there are 22 geographic areas under Air Traffic Control (ATC) jurisdiction. Air traffic services within each area are provided by air traffic controllers in Air Route Traffic Control Centers (ARTCC). The ARTCCs provide air traffic service to aircraft operating on Instrument Flight Rules (IFR) flight plans within controlled airspace—primarily during the enroute phase of flight. Those aircraft operating under Visual Flight Rules (VFR) depend primarily on the "see and avoid" principle for separation and may also contact the ARTCC, or other ATC services, to request traffic advisory services. Traffic advisory service alerts pilots of known air traffic in the vicinity of, or within the flight path of, the aircraft. COS airspace operates within the Denver ARTCC jurisdiction. Denver ARTCC manages airspace ranging from southwest South Dakota to northeast Arizona, along with portions of Utah, New Mexico, Kansas, Nebraska, and Wyoming. COS can be found on the Denver sectional chart (**Figure 2-11**).

The Colorado Springs Terminal Radar Approach Control (TRACON) has jurisdiction over airspace in the Colorado Springs area. The Denver Center delegates control of airspace in the region to the Colorado Springs TRACON and is referred to by pilots as Colorado Springs Approach or Colorado Springs Departure control. The Colorado Springs TRACON is within the COS Airport Traffic Control Tower (ATCT).

Air traffic controllers primarily use computerized radar systems that are supplemented with two-way radio communications to direct aircraft. Altitude assignments, speed adjustments, and radar vectors are techniques used by controllers to ensure that aircraft maintain proper separation. The lateral and vertical separation criterion for aircraft used by controllers is as follows:

- Lateral Aircraft Separation: three miles (radar environment)
- Lateral Aircraft Separation: five miles (non-radar environment)
- Vertical Aircraft Separation: 1,000 feet (below 29,000 feet) and 2,000 feet (at or above 29,000 feet)

Traffic at COS is controlled by an Airport Traffic Control Tower (ATCT) located on the north side within property of the Peterson SFB. The ATCT is an FAA tower

staffed by controllers 24 hours a day, seven days a week. Aviation communication frequencies associated with COS are shown in **Table 2-17**.

Table 2-17: COS Communication

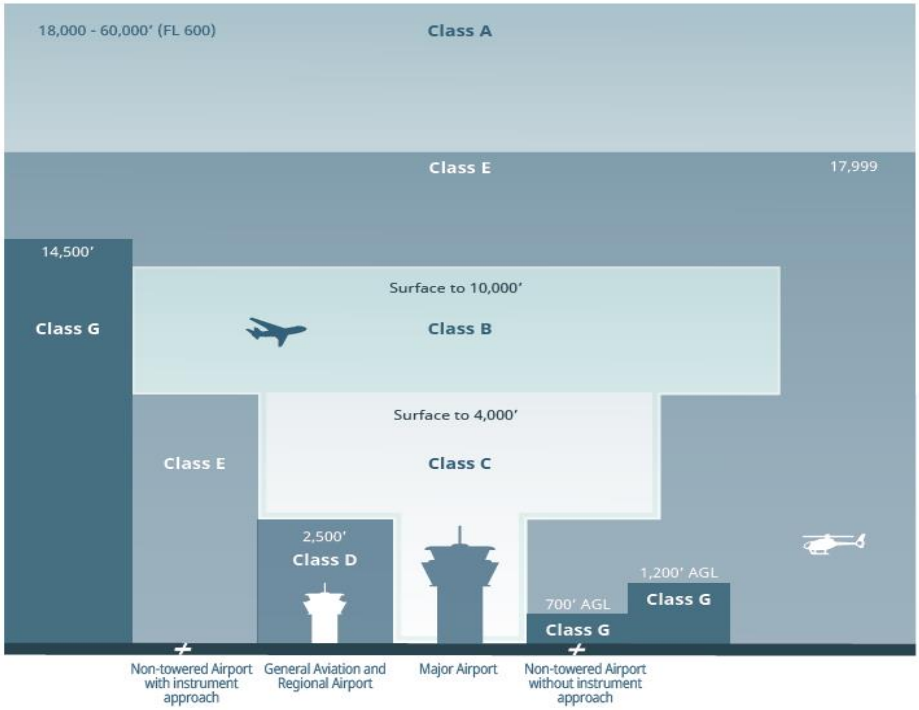
Communications Method	Frequency / Phone Number
UNICOM (Universal Communications)	122.95 MHz
Automatic Terminal Information System (ATIS)	125.0 MHz
Automated Surface Observation System (ASOS)	719-380-6748
Springs Ground	121.7 MHz
Springs Tower	119.9 MHz
Springs Approach and Departure	124.0 MHz
West Local	133.15 MHz
Clearance Delivery	134.45 MHz
Additional Approach Frequency	120.6 MHz

Source: FAA

The National Airspace System (NAS)

To ensure a safe and efficient airspace environment for all aspects of aviation, the FAA has instituted an airspace structure through the Federal Aviation Regulations (FAR) that establishes and regulates procedures for aircraft that use the NAS. This airspace structure provides two basic categories of airspace: controlled (classified as Class A, B, C, D, and E) and uncontrolled (classified as Class G). **Figure 2-10** below generally illustrates each airspace type.

Figure 2-10: Airspace Classification Illustration



Source: FAA

Further, FAR Part 71 and FAR Part 73 define these airspace classifications with the following characteristics:

- Class A airspace ranges from 18,000 feet mean sea level (MSL) up to Flight Level 600 (60,000 feet MSL). Unless authorized, all operation in Class A airspace is conducted under instrument flight rules.
- Class B airspace ranges from the surface to 10,000 feet MSL and surrounds the nation's busiest airports. An ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace.
- Class C airspace ranges from the surface to 4,000 feet MSL above airport elevation surrounding those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of IFR operations or passenger enplanements. Each aircraft must establish two-way radio communications with the respective ATC facility prior to entering the airspace and maintain those communications while within the airspace.
- Class D airspace ranges from the surface to 2,500 feet MSL above the airport elevation surrounding those airports that have an operational control tower. Unless otherwise authorized, each aircraft must establish two-way radio communications with the respective ATC facility prior to entering the airspace and maintain those communications while in the airspace.
- Class E airspace comprises all controlled airspace that is not Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Only aircraft operating under IFR are required to be in contact with an ATC when operating within Class E airspace.
- Class G, or uncontrolled airspace, is the portion of airspace that has not been designated with any of the above classifications. It extends from the surface to the base of the overlying Class E airspace. Although an ATC has no authority or responsibility to control air traffic, pilots must still abide by visual flight rules (VFR) minimums in Class G airspace.

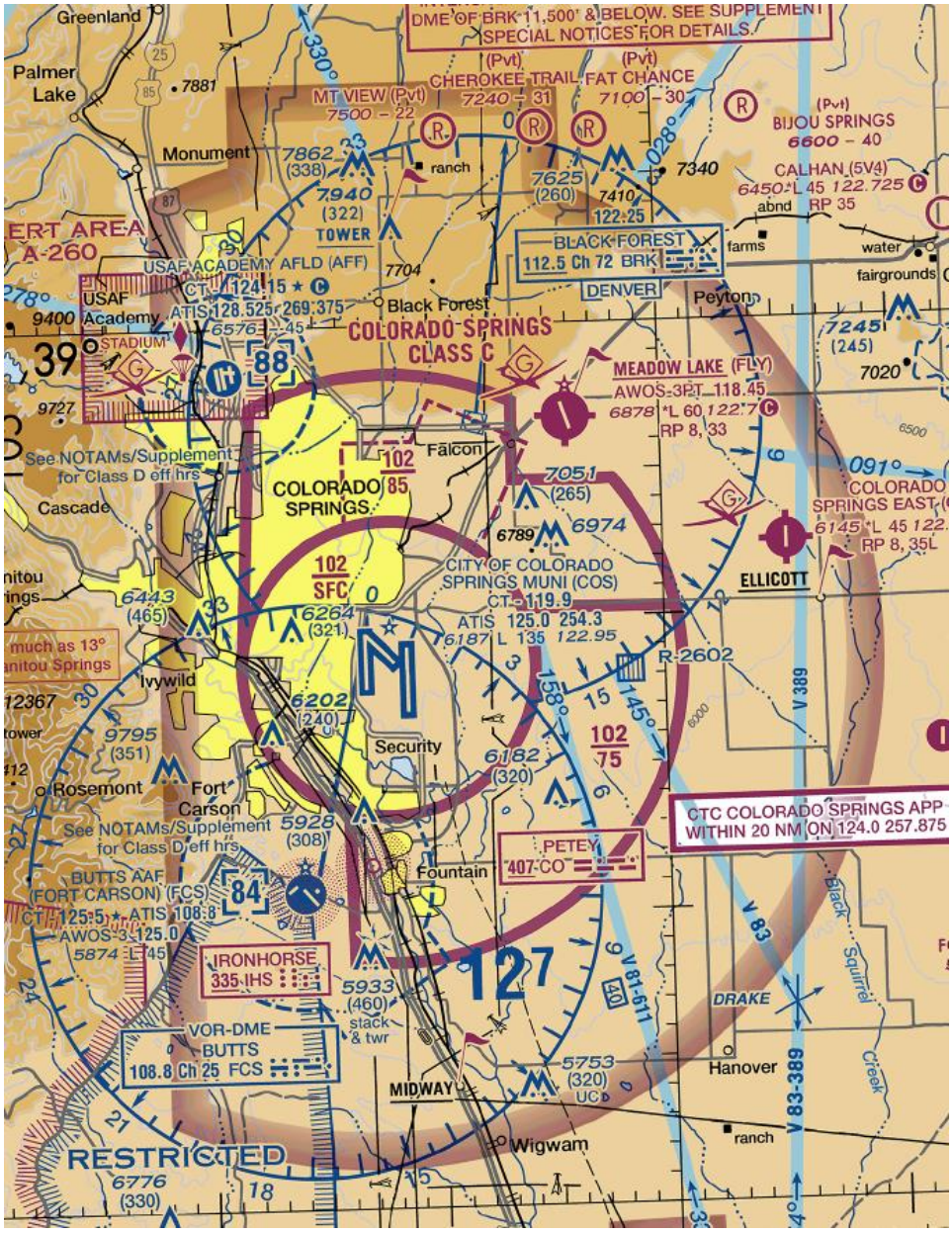
Pilots must obtain air traffic clearances when operating to and from COS in both IFR and VFR conditions. COS lies in Class C airspace, which extends up to 4,000 feet above the Airport's published elevation (extending to 10,200 MSL). **Figure 2-11** and **Figure 2-12** show a portion of the sectional aeronautical chart published by the FAA's National Aeronautical Charting Office for the airspace around COS.

The Denver Class B airspace lies approximately 30 nautical miles north of the Colorado Springs Airport. While the Airport is not located in the Class B airspace, its nearby presence can occasionally influence airport operations.

Several military operations areas (MOAs) and restricted areas are in the vicinity of the Airport and impact the availability of airspace for civilian use. Alert Area A-

260 is located around the United States Air Force Academy, located to the northwest, while Restricted Area R-2601 surrounds Fort Carson to the southwest. Two other alert areas, A-639A and A-639B are located east of the Airport. Three MOAs (Airburst X, Y and Z) are located southwest of the Airport. Further southwest is La Veta Low and High MOA. To the east of the Airport is the Cougar High and Low MOA.

Figure 2-11: COS Immediate Airspace



Source: Denver Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration

Figure 2-12: COS Vicinity Airspace

Source: Denver Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration

Navigational Aids (NAVAIDS)

A variety of navigational facilities are currently available for use in the region by COS and other pilots. Many of these navigational aids (NAVAIDS) are available to enroute air traffic as well. Specifically, NAVAIDS currently available in the area include a Very High Frequency Omnirange Test (VOT) facility and an airport surveillance radar (ASR) system located on the Airport, two non-directional beacons (NDB), two Very High Frequency Omnirange (VOR)/Distance Measuring Equipment (DME) facilities, and a VOR/Tactical Air Navigation (VORTAC) facility. These NAVAIDS are listed in **Table 2-18**.

Table 2-18: NAVAIDS in Proximity to COS

Type	ID	Name	Frequency	Radial	Range
NDB	IHS	Ironhorse	335	010	8.0 nm
NDB	CO	Petey	407	358	6.7 nm
VOR/DME	BRK	Black Forest	112.5	193	8.9 nm
VOR/DME	FCS	Butts	108.8	007	8.0 nm
VORTAC	PUB	Pueblo	116.7	329	33.2 nm
VOT	COS	Colorado Springs	110.4	-	-

Source: Denver Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration

The Airport has two Standard Terminal Arrival Routes (STARs): DEBERRY FOUR and OZZZY FOUR. STARs are used by aircraft following an IFR flight plan to ease coordination with the ATCT while nearing arrival. OZZZY FOUR is also an area navigation arrival procedure for aircraft equipped with GPS.

There are 15 published instrument approaches at COS.

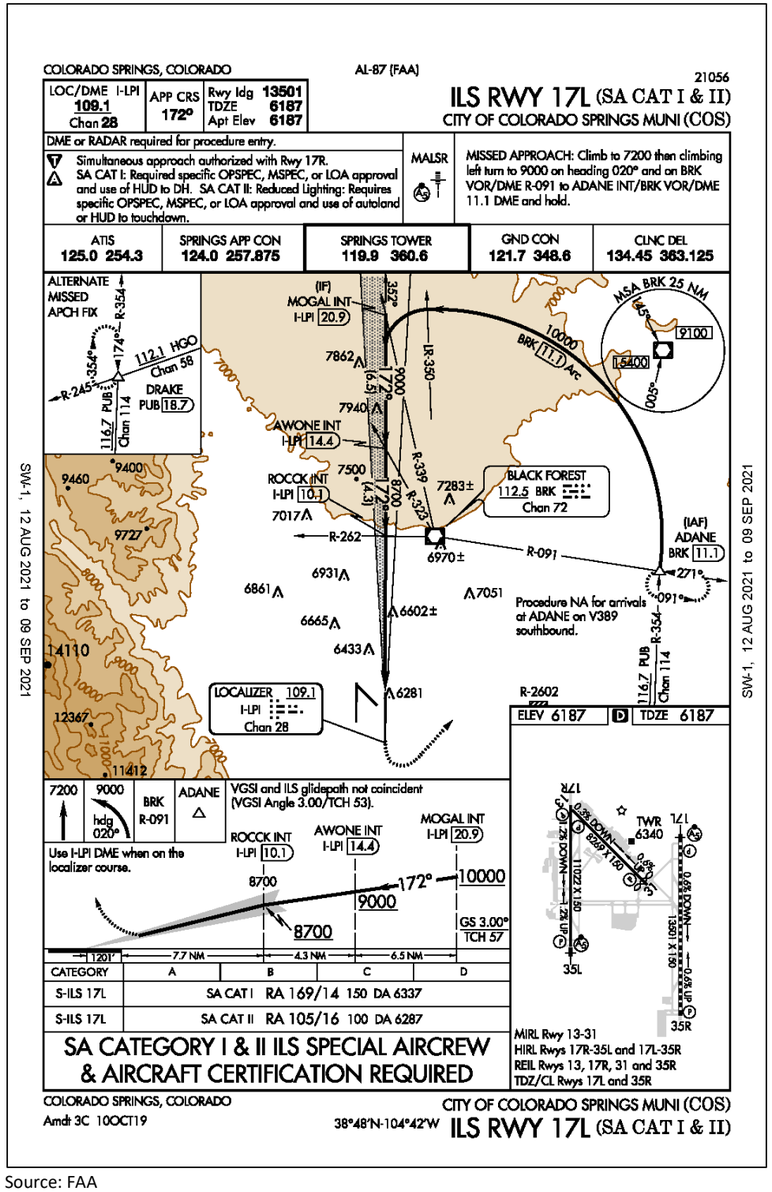
Table 2-19 summarizes the approach and visibility minimums of these published approaches. **Figure 2-13** through **Figure 2-27** show the current approach plates for these published approaches.

Table 2-19: Lowest Published Instrument Approach Minima at COS

Instrument Approach	Lowest Straight-In Minimums		Lowest Circling Minimums	
	Ceiling (MSL/AGL)	Visibility	Ceiling (MSL/AGL)	Visibility
ILS RWY 17L CAT I	6,337' / 150'	1,400'	-	-
ILS RWY 17L SA CAT II	6,287' 100'	1,600'	-	-
ILS RWY 35L CAT II	6,175' / 100'	1,200'	-	-
ILS/LOC RWY 17L	ILS – 6,387' / 200'	ILS – 1,800'	7,540' / 1,353'	1 ¼-mile (Cat A)
ILS/LOC RWY 35L	ILS – 6,275' / 200'	ILS – 2,400'	6,740' / 553'	1-mile (Cat A)
ILS/LOC RWY 35R	ILS – 6,318' / 200'	ILS – 4,000'	6,740' / 553'	1-mile (Cat A)
RNAV (GPS) RWY 31	6,440' / 284'	7/8-mile (Cat C/D)	6,740' / 553'	1-mile (Cat A/B)
RNAV (GPS) RWY 17L	6,387' / 200'	1,800'	7,000' / 813'	1 ¼-mile (Cat A/B)
RNAV (GPS) RWY 17R	6,377' / 200'	4,000'	6,740' / 553'	1-mile (Cat A)
RNAV (GPS) RWY 35L	6,275' / 200'	2,400'	6,740' / 553'	1-mile (Cat A)
RNAV (GPS) RWY 35R	6,318' / 200'	4,000'	6,740' / 553'	1-mile (Cat A)
RNAV (RNP) RWY 17L	6,557' / 370'	4,000'	-	-
RNAV (RNP) RWY 17R	6,659' / 482'	1 5/8-mile	-	-
RNAV (RNP) RWY 35L	6,372' / 297'	3,000'	-	-
RNAV (RNP) RWY 35R	6,461' / 343'	6,000'	-	-
NDB RWY 35L	6,540' / 465' (Cat A/B)	4,000'	6,740' / 553'	1-mile (Cat A)

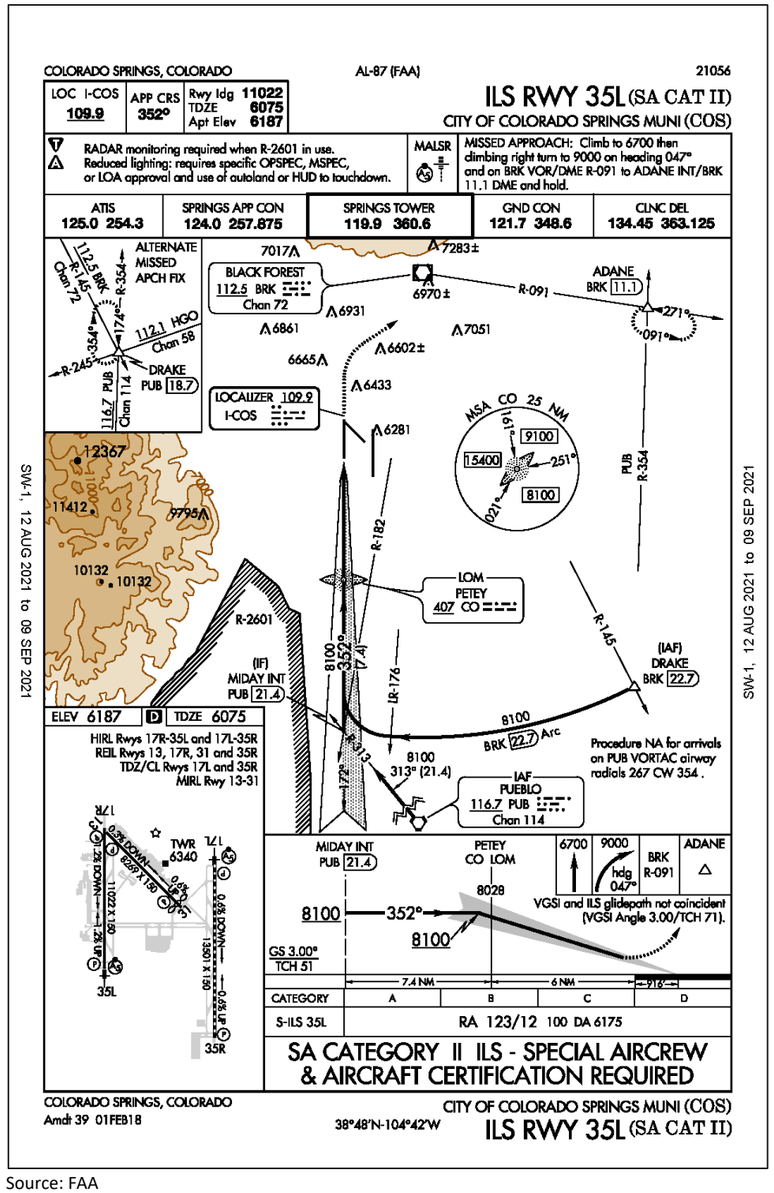
Source: FAA, U.S. Terminal Procedure Publications

Figure 2-13: Instrument Approach Plate – ILS RWY 17L


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
ILS RWY 17L (SA CAT I & II)
CITY OF COLORADO SPRINGS MUNI (COS)
LOC/DME I-LPI 109.1 Chan 28
APP CRS 172°
Rwy Idg 13501
TDZE 6187
Apt Elev 6187
DME or RADAR required for procedure entry.
Simultaneous approach authorized with Rwy 17R.
SA CAT I: Required specific OPSPEC, MSPEC, or LOA approval and use of HUD to DH. SA CAT II: Reduced Lighting: Requires specific OPSPEC, MSPEC, or LOA approval and use of autoland or HUD to touchdown.
MALSR
MISSED APPROACH: Climb to 7200 then climbing left turn to 9000 on heading 020° and on BRK VOR/DME R-091 to ADANE INT/BRK VOR/DME 11.1 DME and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
ALTERNATE MISSED APCH FIX
112.1 HGO Chan 58
DRAKE PUB 18.7
116.7 PUB Chan 114
(IF) MOGAL INT I-LPI 20.9
AWONE INT I-LPI 14.4
ROCCK INT I-LPI 10.1
MSA BRK 25 NM
BLACK FOREST 112.5 BRK Chan 72
(IAF) ADANE BRK 11.1
Procedure NA for arrivals at ADANE on V389 southbound.
LOCALIZER 109.1 I-LPI Chan 28
R-2602
ELEV 6187
TDZE 6187
7200
9000 hdg 020°
BRK R-091
ADANE
VGSI and ILS glidepath not coincident (VGSI Angle 3.00/TCH 53).
Use I-LPI DME when on the localizer course.
8700
9000
10000
172°
GS 3.00° TCH 57
7.7 NM
4.3 NM
6.5 NM
CATEGORY A B C D
S-ILS 17L SA CAT I RA 169/14 150 DA 6337
S-ILS 17L SA CAT II RA 105/16 100 DA 6287
SA CATEGORY I & II ILS SPECIAL AIRCREW & AIRCRAFT CERTIFICATION REQUIRED
MIRL Rwy 13-31
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31 and 35R
TDZ/CL Rwys 17L and 35R
TWR 6340
COLORADO SPRINGS, COLORADO
Amdt 3C 10OCT19
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
ILS RWY 17L (SA CAT I & II)
SW-1, 12 AUG 2021 to 09 SEP 2021

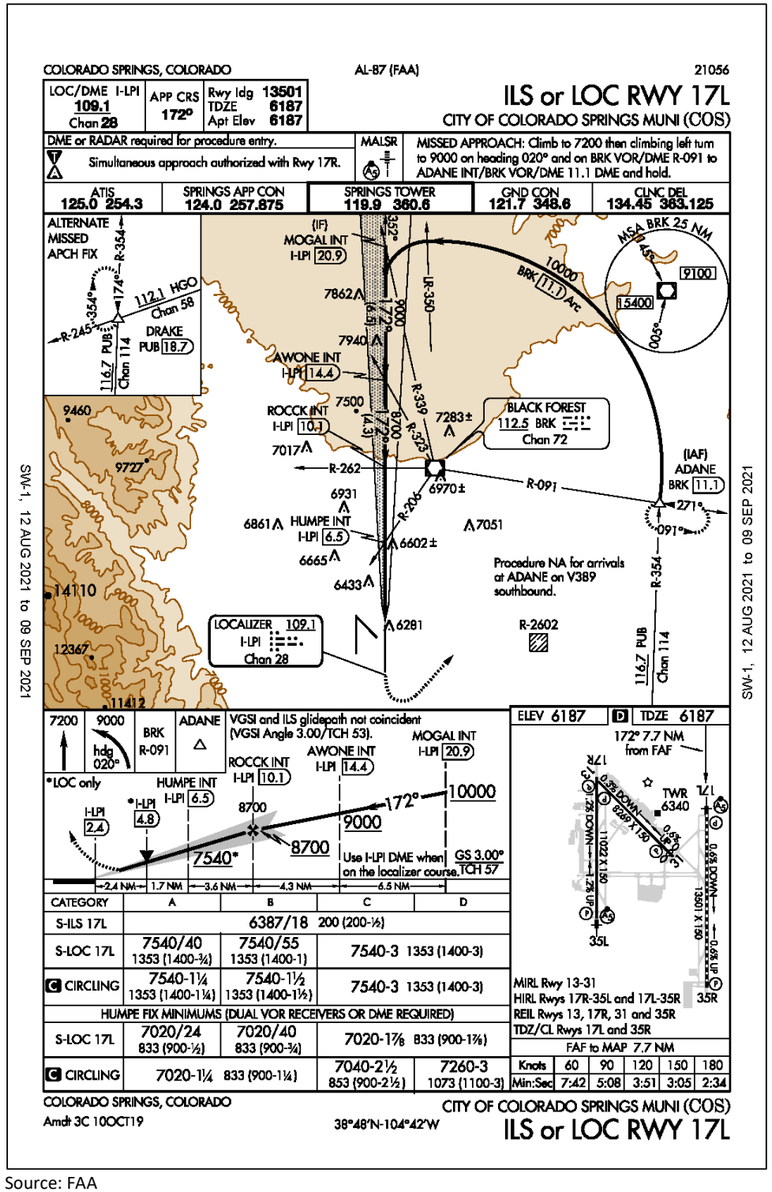
Source: FAA

Figure 2-14: Instrument Approach Plate – ILS RWY 35L


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
ILS RWY 35L (SA CAT II)
CITY OF COLORADO SPRINGS MUNI (COS)
LOC I-COS 109.9
APP CRS 352°
Rwy Idg 11022
TDZE 6075
Apt Elev 6187
RADAR monitoring required when R-2601 in use.
Reduced lighting; requires specific OPSPEC, MSPEC, or LOA approval and use of autoland or HUD to touchdown.
MALSR
MISSED APPROACH: Climb to 6700 then climbing right turn to 9000 on heading 047° and on BRK VOR/DME R-091 to ADANE INT/BRK 11.1 DME and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
ALTERNATE MISSED APCH FIX
112.1 HGO Chan 58
DRAKE PUB 18.7
116.7 PUB Chan 114
BLACK FOREST 112.5 BRK Chan 72
LOCALIZER 109.9 I-COS
MSA CO 25 NM
LOM PETEY 407 CO
(IF) MIDAY INT PUB 21.4
(IAF) DRAKE BRK 22.7
Procedure NA for arrivals on PUB VORTAC airway radials 267 CW 354 .
IAF PUEBLO 116.7 PUB Chan 114
R-2601
ELEV 6187
TDZE 6075
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31 and 35R
TDZ/CL Rwys 17L and 35R
MIRL Rwy 13-31
TWR 6340
MIDAY INT PUB 21.4
PETEY CO LOM
6700
9000 hdg 047°
BRK R-091
ADANE
8100
352°
GS 3.00° TCH 51
7.4 NM
6 NM
CATEGORY A B C D
S-ILS 35L RA 123/12 100 DA 6175
SA CATEGORY II ILS - SPECIAL AIRCREW & AIRCRAFT CERTIFICATION REQUIRED
COLORADO SPRINGS, COLORADO
Amdt 39 01FEB18
38°48'N-104°42'W
ILS RWY 35L (SA CAT II)
SW-1, 12 AUG 2021 to 09 SEP 2021

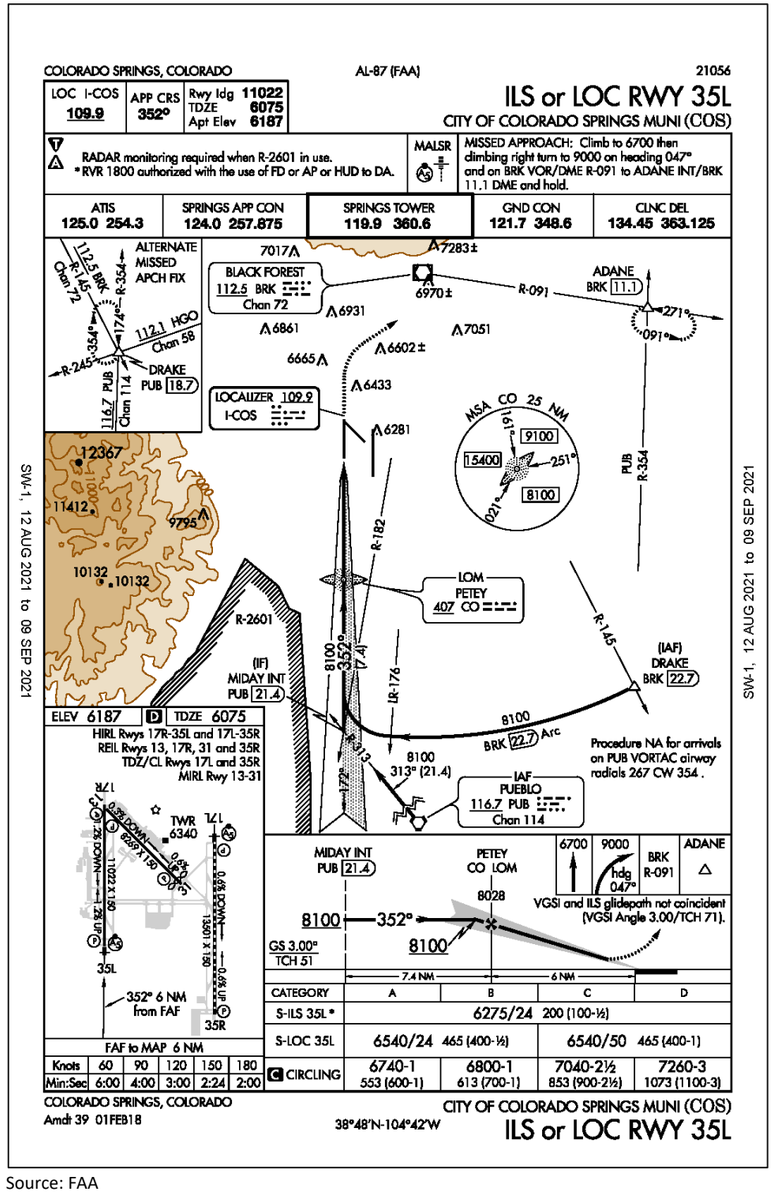
Source: FAA

Figure 2-15: Instrument Approach Plate – ILS/LOC RWY 17L


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
ILS or LOC RWY 17L
CITY OF COLORADO SPRINGS MUNI (COS)
LOC/DME I-LPI 109.1 Chan 28
APP CRS 172°
Rwy Idg 13501
TDZE 6187
Apt Elev 6187
DME or RADAR required for procedure entry.
Simultaneous approach authorized with Rwy 17R.
MALSR
MISSED APPROACH: Climb to 7200 then climbing left turn to 9000 on heading 020° and on BRK VOR/DME R-091 to ADANE INT/BRK VOR/DME 11.1 DME and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
ALTERNATE MISSED APCH FIX
112.1 HGO Chan 58
DRAKE PUB 18.7
116.7 PUB Chan 114
(IF) MOGAL INT I-LPI 20.9
AWONE INT I-LPI 14.4
ROCCK INT I-LPI 10.1
HUMPE INT I-LPI 6.5
BLACK FOREST 112.5 BRK Chan 72
(IAF) ADANE BRK 11.1
MSA BRK 25 NM
9100
15400
10000 BRK 11.1 Arc
LOCALIZER 109.1 I-LPI Chan 28
Procedure NA for arrivals at ADANE on V389 southbound.
R-2602
VGSI and ILS glidepath not coincident (VGSI Angle 3.00/TCH 53).
*LOC only
GS 3.00° TCH 57
Use I-LPI DME when on the localizer course.
ELEV 6187
TDZE 6187
172° 7.7 NM from FAF
TWR 6340
MIRL Rwy 13-31
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31 and 35R
TDZ/CL Rwys 17L and 35R
FAF to MAP 7.7 NM
Knots 60 90 120 150 180
Min:Sec 7:42 5:08 3:51 3:05 2:34
CATEGORY A B C D
S-ILS 17L 6387/18 200 (200-½)
S-LOC 17L 7540/40 1353 (1400-¾) 7540/55 1353 (1400-1) 7540-3 1353 (1400-3)
C CIRCLING 7540-1¼ 1353 (1400-1¼) 7540-1½ 1353 (1400-1½) 7540-3 1353 (1400-3)
HUMPE FIX MINIMUMS (DUAL VOR RECEIVERS OR DME REQUIRED)
S-LOC 17L 7020/24 833 (900-½) 7020/40 833 (900-¾) 7020-1⅞ 833 (900-1⅞)
C CIRCLING 7020-1¼ 833 (900-1¼) 7040-2½ 853 (900-2½) 7260-3 1073 (1100-3)
COLORADO SPRINGS, COLORADO
Amdt 3C 10OCT19
38°48'N-104°42'W
CITY OF COLORADO SPRINGS MUNI (COS)
ILS or LOC RWY 17L
SW-1, 12 AUG 2021 to 09 SEP 2021

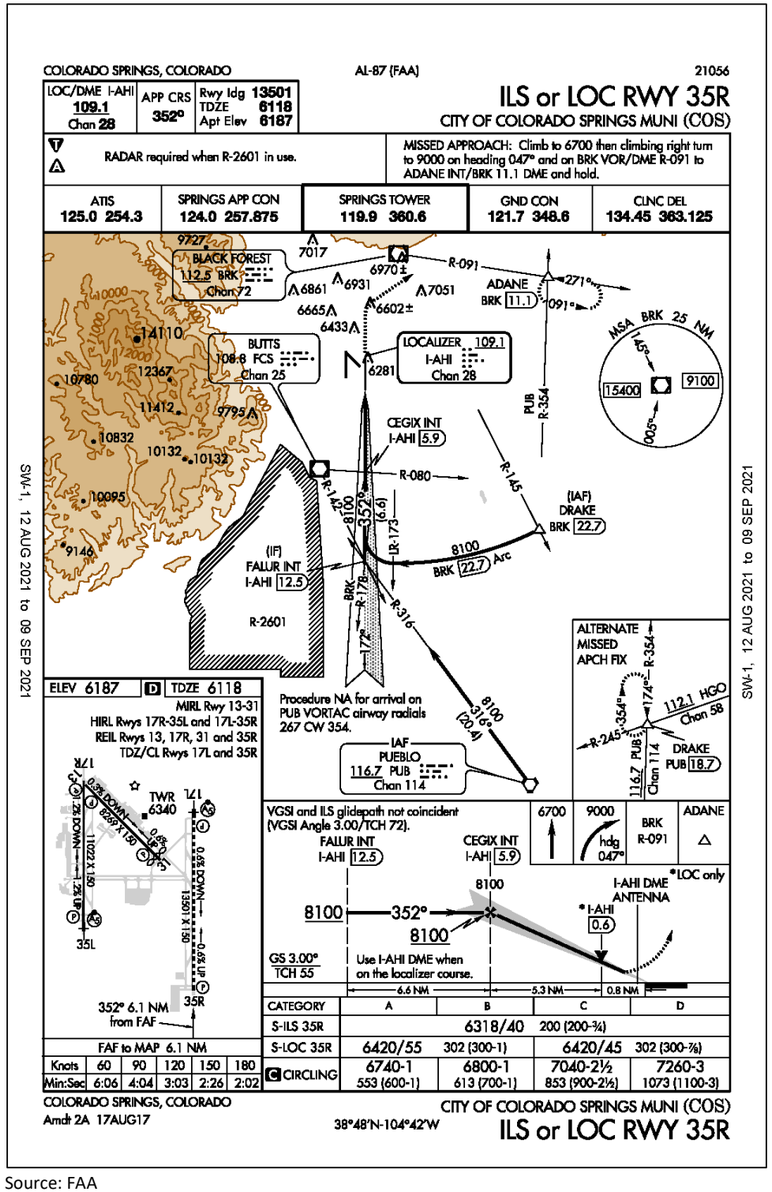
Source: FAA

Figure 2-16: Instrument Approach Plate – ILS/LOC RWY 35L


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
ILS or LOC RWY 35L
CITY OF COLORADO SPRINGS MUNI (COS)
LOC I-COS 109.9
APP CRS 352°
Rwy Idg 11022
TDZE 6075
Apt Elev 6187
RADAR monitoring required when R-2601 in use.
*RVR 1800 authorized with the use of FD or AP or HUD to DA.
MALSR
MISSED APPROACH: Climb to 6700 then climbing right turn to 9000 on heading 047° and on BRK VOR/DME R-091 to ADANE INT/BRK 11.1 DME and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
ALTERNATE MISSED APCH FIX
112.1 HGO Chan 58
DRAKE PUB 18.7
116.7 PUB Chan 114
BLACK FOREST 112.5 BRK Chan 72
LOCALIZER 109.9 I-COS
ADANE BRK 11.1
MSA CO 25 NM
9100
15400
8100
LOM PETEY 407 CO
(IF) MIDAY INT PUB 21.4
(IAF) DRAKE BRK 22.7
8100 BRK 22.7 Arc
IAF PUEBLO 116.7 PUB Chan 114
Procedure NA for arrivals on PUB VORTAC airway radials 267 CW 354 .
R-2601
VGSI and ILS glidepath not coincident (VGSI Angle 3.00/TCH 71).
GS 3.00° TCH 51
ELEV 6187
TDZE 6075
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31 and 35R
TDZ/CL Rwys 17L and 35R
MIRL Rwy 13-31
TWR 6340
352° 6 NM from FAF
FAF to MAP 6 NM
Knots 60 90 120 150 180
Min:Sec 6:00 4:00 3:00 2:24 2:00
CATEGORY A B C D
S-ILS 35L * 6275/24 200 (100-½)
S-LOC 35L 6540/24 465 (400-½) 6540/50 465 (400-1)
C CIRCLING 6740-1 553 (600-1) 6800-1 613 (700-1) 7040-2½ 853 (900-2½) 7260-3 1073 (1100-3)
COLORADO SPRINGS, COLORADO
Amdt 39 01FEB18
38°48'N-104°42'W
CITY OF COLORADO SPRINGS MUNI (COS)
ILS or LOC RWY 35L
SW-1, 12 AUG 2021 to 09 SEP 2021

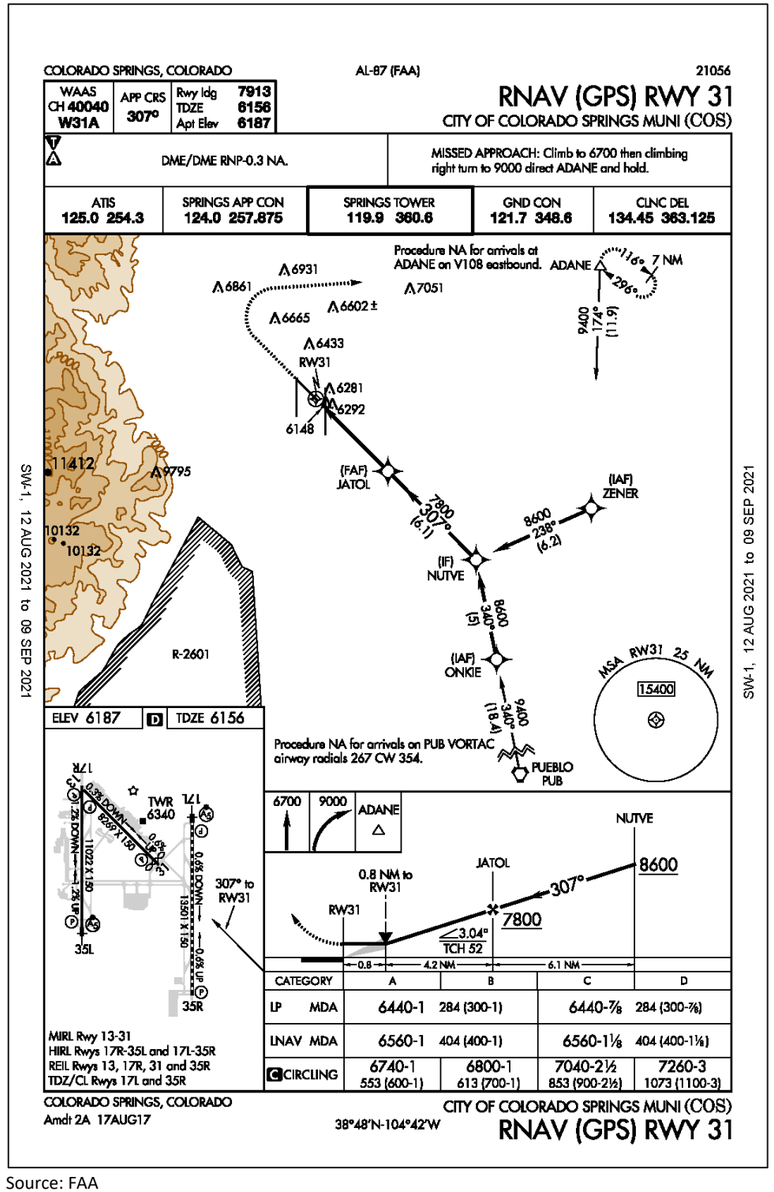
Source: FAA

Figure 2-17: Instrument Approach Plate – ILS/LOC RWY 35R


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
ILS or LOC RWY 35R
CITY OF COLORADO SPRINGS MUNI (COS)
LOC/DME I-AHI 109.1 Chan 28
APP CRS 352°
Rwy Idg 13501
TDZE 6118
Apt Elev 6187
RADAR required when R-2601 in use.
MISSED APPROACH: Climb to 6700 then climbing right turn to 9000 on heading 047° and on BRK VOR/DME R-091 to ADANE INT/BRK 11.1 DME and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
BLACK FOREST 112.5 BRK Chan 72
BUTTS 108.8 FCS Chan 25
LOCALIZER 109.1 I-AHI Chan 28
ADANE BRK 11.1
MSA BRK 25 NM
CEGIX INT I-AHI 5.9
FALLR INT I-AHI 12.5
(IF)
(IAF) DRAKE BRK 22.7
R-2601
ALTERNATE MISSED APCH FIX
Procedure NA for arrival on PUB VORTAC airway radials 267 CW 354.
IAF PUEBLO 116.7 PUB Chan 114
DRAKE PUB 18.7
ELEV 6187
D TDZE 6118
MIRL Rwy 13-31
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31 and 35R
TDZ/CL Rwys 17L and 35R
TWR 6340
11022 X 150
13501 X 150
352° 6.1 NM from FAF
VGSI and ILS glidepath not coincident (VGSI Angle 3.00/TCH 72).
6700
9000
BRK R-091
ADANE
hdg 047°
*LOC only
I-AHI DME ANTENNA
GS 3.00° TCH 55
Use I-AHI DME when on the localizer course.
6.6 NM
5.3 NM
0.8 NM
FAF to MAP 6.1 NM
Knots 60 90 120 150 180
Min:Sec 6:06 4:04 3:03 2:26 2:02
CATEGORY A B C D
S-ILS 35R 6318/40 200 (200-¾)
S-LOC 35R 6420/55 302 (300-1) 6420/45 302 (300-⅞)
CIRCLING 6740-1 553 (600-1) 6800-1 613 (700-1) 7040-2½ 853 (900-2½) 7260-3 1073 (1100-3)
COLORADO SPRINGS, COLORADO
Amdt 2A 17AUG17
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
ILS or LOC RWY 35R
SW-1, 12 AUG 2021 to 09 SEP 2021

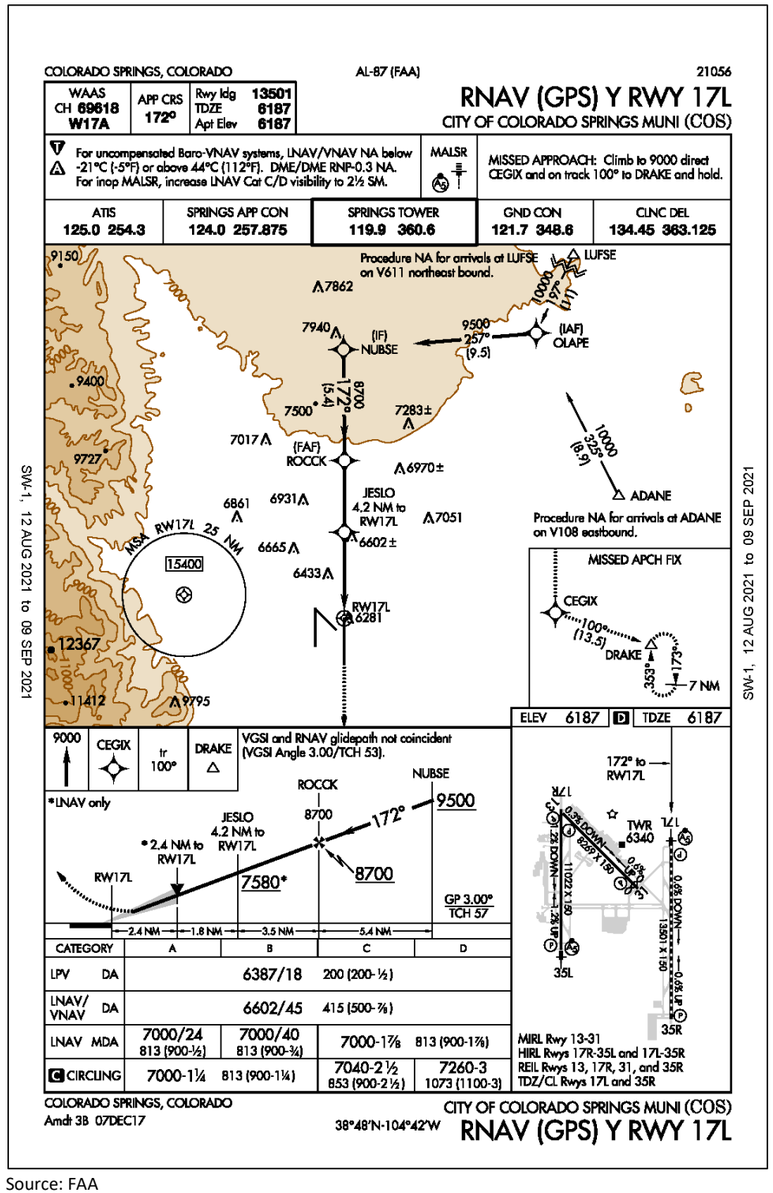
Source: FAA

Figure 2-18: Instrument Approach Plate – RNAV (GPS) RWY 31


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
RNAV (GPS) RWY 31
CITY OF COLORADO SPRINGS MUNI (COS)
WAAS CH 40040 W31A
APP CRS 307°
Rwy Idg 7913
TDZE 6156
Apt Elev 6187
DME/DME RNP-0.3 NA.
MISSED APPROACH: Climb to 6700 then climbing right turn to 9000 direct ADANE and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
Procedure NA for arrivals at ADANE on V108 eastbound.
ADANE 116° 7 NM 296°
RW31
(FAF) JATOL
(IAF) ZENER
(IF) NUTVE
(IAF) ONKIE
R-2601
MSA RW31 25 NM
Procedure NA for arrivals on PUB VORTAC airway radials 267 CW 354.
PUEBLO PUB
ELEV 6187
D TDZE 6156
TWR 6340
11022 X 150
13501 X 150
307° to RW31
0.8 NM to RW31
3.04° TCH 52
4.2 NM
6.1 NM
CATEGORY A B C D
LP MDA 6440-1 284 (300-1) 6440-⅞ 284 (300-⅞)
LNAV MDA 6560-1 404 (400-1) 6560-1⅛ 404 (400-1⅛)
CIRCLING 6740-1 553 (600-1) 6800-1 613 (700-1) 7040-2½ 853 (900-2½) 7260-3 1073 (1100-3)
MIRL Rwy 13-31
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31 and 35R
TDZ/CL Rwys 17L and 35R
COLORADO SPRINGS, COLORADO
Amdt 2A 17AUG17
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
RNAV (GPS) RWY 31
SW-1, 12 AUG 2021 to 09 SEP 2021

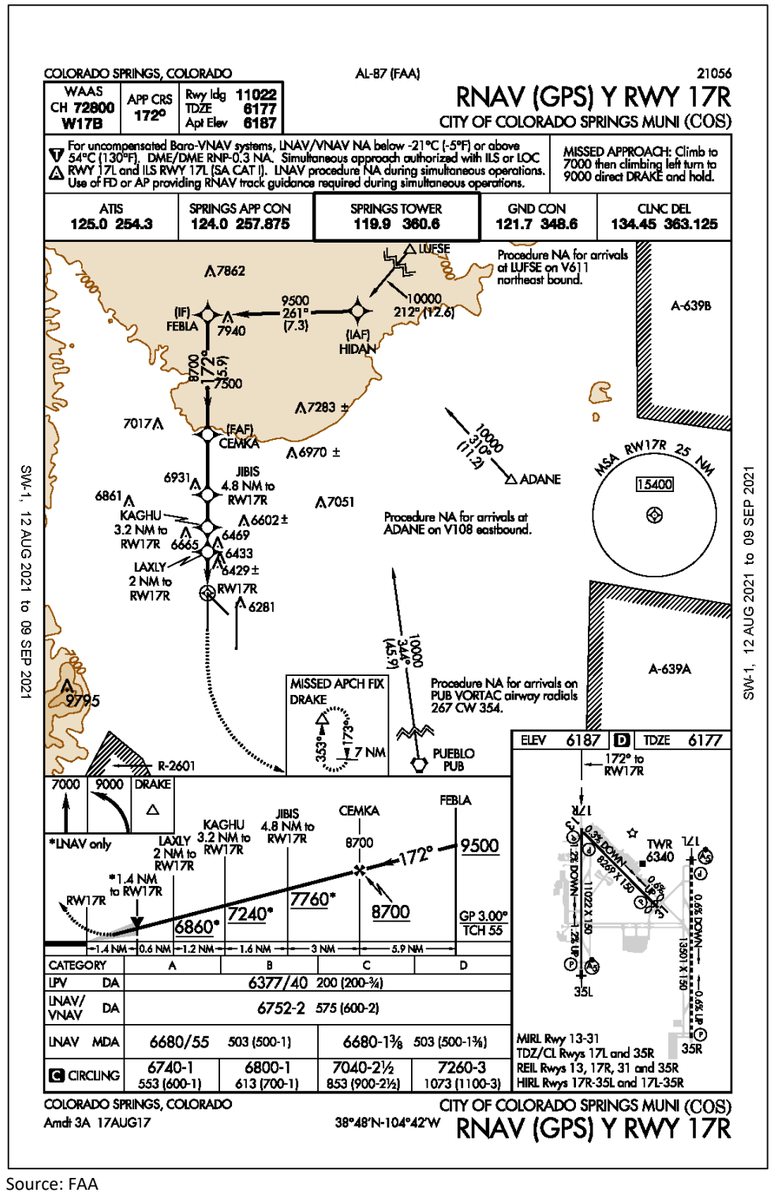
Source: FAA

Figure 2-19: Instrument Approach Plate – RNAV (GPS) RWY 17L


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
RNAV (GPS) Y RWY 17L
CITY OF COLORADO SPRINGS MUNI (COS)
WAAS CH 69618 W17A
APP CRS 172°
Rwy Idg 13501
TDZE 6187
Apt Elev 6187
For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -21°C (-5°F) or above 44°C (112°F). DME/DME RNP-0.3 NA. For inop MALSR, increase LNAV Cat C/D visibility to 2½ SM.
MALSR
MISSED APPROACH: Climb to 9000 direct CEGIX and on track 100° to DRAKE and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
Procedure NA for arrivals at LUFSE on V611 northeast bound.
LUFSE
(IF) NUBSE
(IAF) OLAPE
9500 257° (9.5)
10000 172° (5.1)
8700 172° (5.4)
(FAF) ROCCK
JESLO 4.2 NM to RW17L
ADANE
10000 325° (8.9)
Procedure NA for arrivals at ADANE on V108 eastbound.
MISSED APCH FIX
CEGIX
100° (13.5)
DRAKE
353° 173° 7 NM
MSA RW17L 25 NM
15400
ELEV 6187 D TDZ 6187
VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 53).
9000 CEGIX tr 100° DRAKE
*LNAV only
2.4 NM to RW17L
7580*
8700
9500
172°
GP 3.00° TCH 57
2.4 NM 1.8 NM 3.5 NM 5.4 NM
CATEGORY A B C D
LPV DA 6387/18 200 (200-½)
LNAV/VNAV DA 6602/45 415 (500-⅜)
LNAV MDA 7000/24 813 (900-½) 7000/40 813 (900-¾) 7000-1⅞ 813 (900-1⅞)
C CIRCLING 7000-1¼ 813 (900-1¼) 7040-2½ 853 (900-2½) 7260-3 1073 (1100-3)
172° to RW17L
TWR 6340
MIRL Rwy 13-31
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31, and 35R
TDZ/CL Rwys 17L and 35R
COLORADO SPRINGS, COLORADO
Amdt 3B 07DEC17
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
RNAV (GPS) Y RWY 17L
SW-1, 12 AUG 2021 to 09 SEP 2021

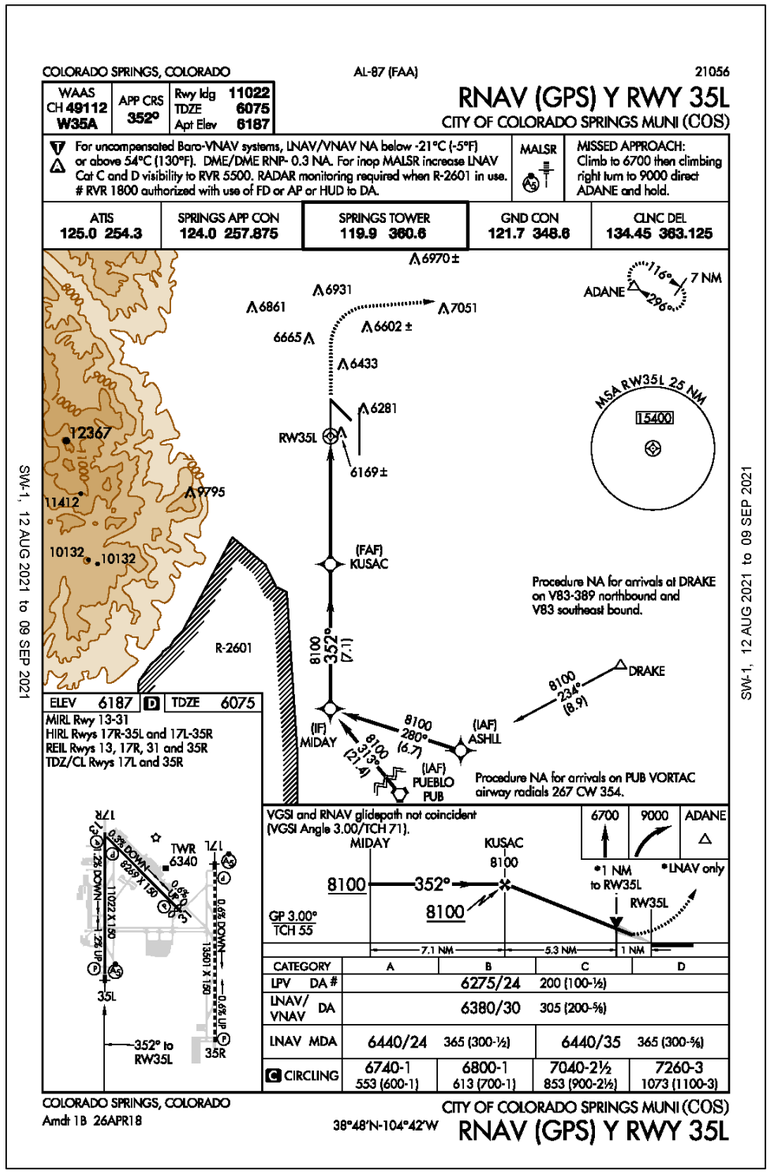
Source: FAA

Figure 2-20: Instrument Approach Plate – RNAV (GPS) RWY 17R


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
RNAV (GPS) Y RWY 17R
CITY OF COLORADO SPRINGS MUNI (COS)
WAAS CH 72800 W17B
APP CRS 172°
Rwy Idg 11022
TDZE 6177
Apt Elev 6187
For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -21°C (-5°F) or above 54°C (130°F). DME/DME RNP-0.3 NA. Simultaneous approach authorized with ILS or LOC RWY 17L and ILS RWY 17L (SA CAT I). LNAV procedure NA during simultaneous operations. Use of FD or AP providing RNAV track guidance required during simultaneous operations.
MISSED APPROACH: Climb to 7000 then climbing left turn to 9000 direct DRAKE and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
Procedure NA for arrivals at LUFSE on V611 northeast bound.
LUFSE
(IF) FEBLA
(IAF) HIDAN
9500 261° (7.3)
10000 212° (12.6)
8700 172° (5.9)
(FAF) CEMKA
JIBIS 4.8 NM to RW17R
KAGHU 3.2 NM to RW17R
LAXLY 2 NM to RW17R
ADANE
10000 310° (11.2)
Procedure NA for arrivals at ADANE on V108 eastbound.
MISSED APCH FIX
DRAKE
353° 173° 7 NM
10000 344° (45.9)
Procedure NA for arrivals on PUB VORTAC airway radials 267 CW 354.
PUEBLO PUB
R-2601
A-639B
A-639A
MSA RW17R 25 NM
15400
ELEV 6187 D TDZ 6177
7000 9000 DRAKE
*LNAV only
1.4 NM to RW17R
6860*
7240*
7760*
8700
9500
172°
GP 3.00° TCH 55
1.4 NM 0.6 NM 1.2 NM 1.6 NM 3 NM 5.9 NM
CATEGORY A B C D
LPV DA 6377/40 200 (200-¾)
LNAV/VNAV DA 6752-2 575 (600-2)
LNAV MDA 6680/55 503 (500-1) 6680-1⅜ 503 (500-1⅜)
C CIRCLING 6740-1 553 (600-1) 6800-1 613 (700-1) 7040-2½ 853 (900-2½) 7260-3 1073 (1100-3)
172° to RW17R
TWR 6340
MIRL Rwy 13-31
TDZ/CL Rwys 17L and 35R
REIL Rwys 13, 17R, 31 and 35R
HIRL Rwys 17R-35L and 17L-35R
COLORADO SPRINGS, COLORADO
Amdt 3A 17AUG17
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
RNAV (GPS) Y RWY 17R
SW-1, 12 AUG 2021 to 09 SEP 2021

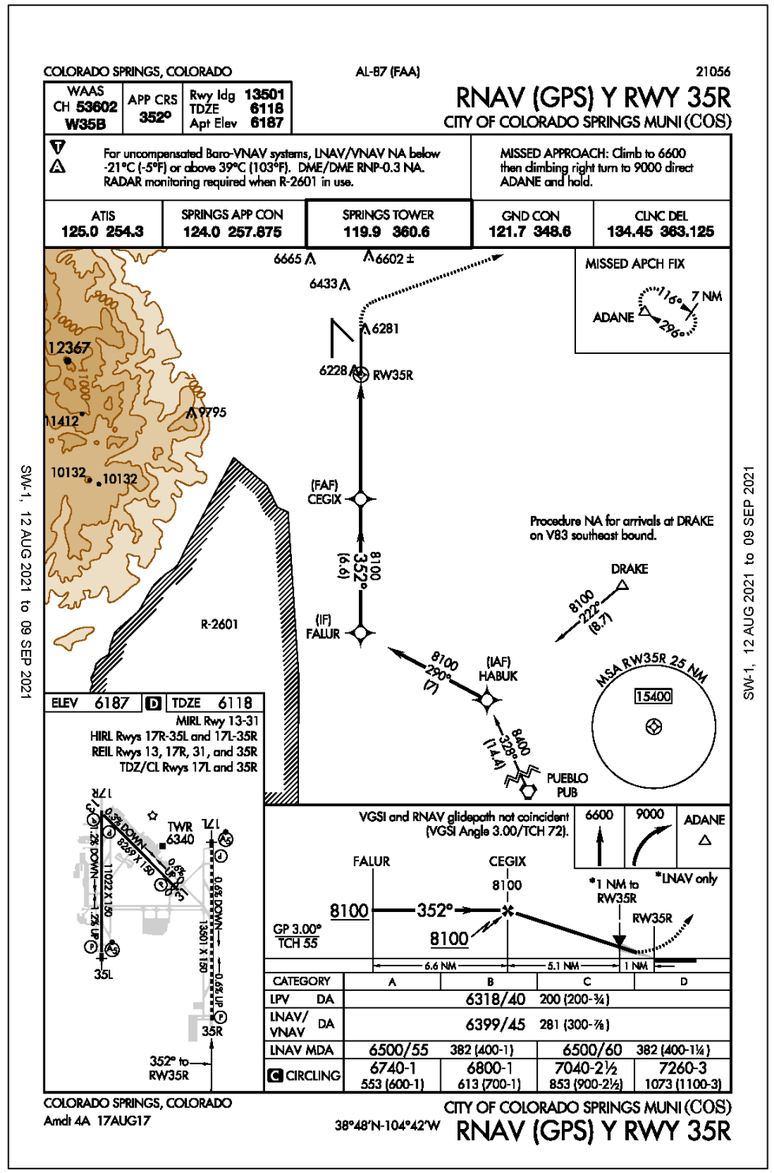
Source: FAA

Figure 2-21: Instrument Approach Plate – RNAV (GPS) RWY 35L


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
WAAS CH 49112 W35A
APP CRS 352°
Rwy Idg 11022
TDZE 6075
Apt Elev 6187
RNAV (GPS) Y RWY 35L
CITY OF COLORADO SPRINGS MUNI (COS)
For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -21°C (-5°F) or above 54°C (130°F). DME/DME RNP- 0.3 NA. For inop MALSR increase LNAV Cat C and D visibility to RVR 5500. RADAR monitoring required when R-2601 in use. # RVR 1800 authorized with use of FD or AP or HUD to DA.
MALSR
MISSED APPROACH: Climb to 6700 then climbing right turn to 9000 direct ADANE and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
ADANE 116° 296° 7 NM
MSA RW35L 25 NM
15400
Procedure NA for arrivals at DRAKE on V83-389 northbound and V83 southeast bound.
DRAKE
Procedure NA for arrivals on PUB VORTAC airway radials 267 CW 354.
R-2601
(FAF) KUSAC
(IF) MIDAY
(IAF) ASHLL
(IAF) PUEBLO PUB
RW35L
ELEV 6187 D TDZE 6075
MIRL Rwy 13-31
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31 and 35R
TDZ/CL Rwys 17L and 35R
TWR 6340
352° to RW35L
VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 71).
MIDAY
KUSAC
8100
352°
GP 3.00° TCH 55
7.1 NM
5.3 NM
1 NM
6700
9000
ADANE
*1 NM to RW35L
*LNAV only
CATEGORY A B C D
LPV DA # 6275/24 200 (100-½)
LNAV/ VNAV DA 6380/30 305 (200-⅝)
LNAV MDA 6440/24 365 (300-½) 6440/35 365 (300-⅝)
C CIRCLING 6740-1 553 (600-1) 6800-1 613 (700-1) 7040-2½ 853 (900-2½) 7260-3 1073 (1100-3)
COLORADO SPRINGS, COLORADO
Amdt 1B 26APR18
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
RNAV (GPS) Y RWY 35L
SW-1, 12 AUG 2021 to 09 SEP 2021

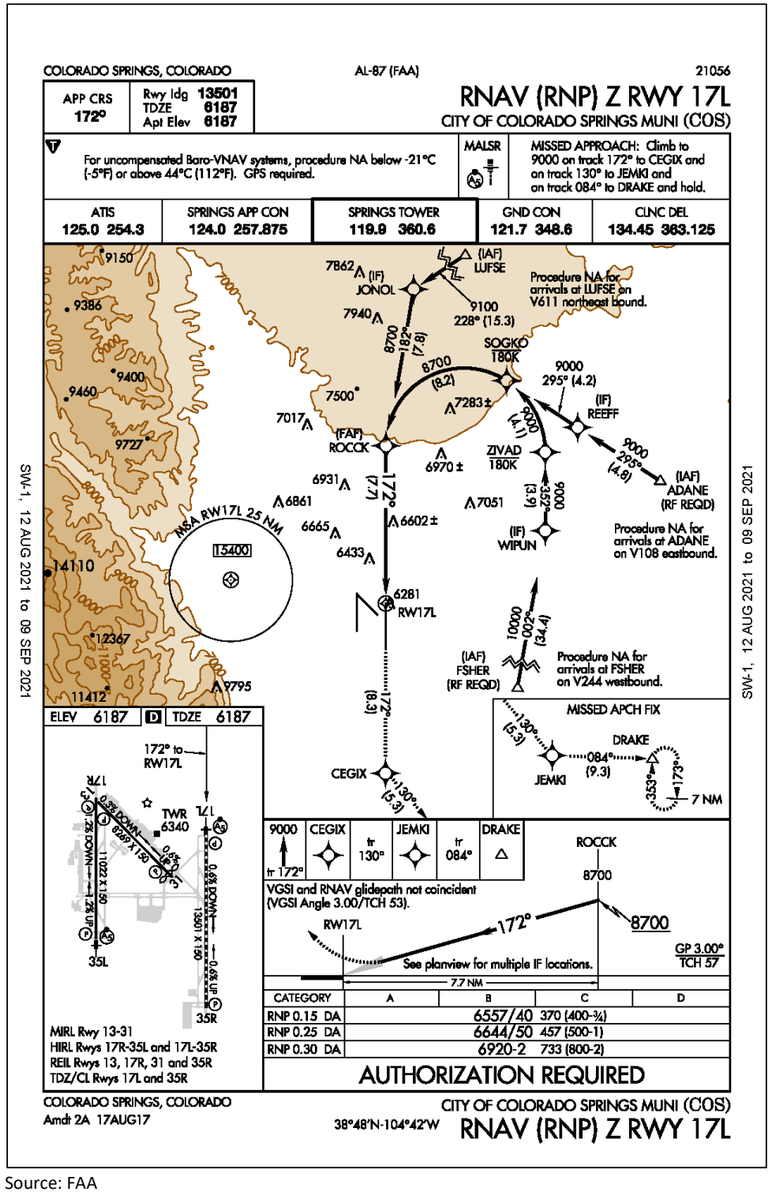
Source: FAA

Figure 2-22: Instrument Approach Plate – RNAV (GPS) RWY 35R


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
WAAS CH 53602 W35B
APP CRS 352°
Rwy Idg 13501
TDZE 6118
Apt Elev 6187
RNAV (GPS) Y RWY 35R
CITY OF COLORADO SPRINGS MUNI (COS)
For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -21°C (-5°F) or above 39°C (103°F). DME/DME RNP-0.3 NA. RADAR monitoring required when R-2601 in use.
MISSED APPROACH: Climb to 6600 then climbing right turn to 9000 direct ADANE and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
MISSED APCH FIX
ADANE 116° 296° 7 NM
Procedure NA for arrivals at DRAKE on V83 southeast bound.
DRAKE
R-2601
(FAF) CEGIX
(IF) FALUR
(IAF) HABUK
RW35R
MSA RW35R 25 NM
15400
PUEBLO PUB
ELEV 6187 D TDZE 6118
MIRL Rwy 13-31
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31, and 35R
TDZ/CL Rwys 17L and 35R
TWR 6340
352° to RW35R
VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 72).
FALUR
CEGIX
8100
352°
GP 3.00° TCH 55
6.6 NM
5.1 NM
1 NM
6600
9000
ADANE
*1 NM to RW35R
*LNAV only
CATEGORY A B C D
LPV DA 6318/40 200 (200-¾)
LNAV/ VNAV DA 6399/45 281 (300-⅞)
LNAV MDA 6500/55 382 (400-1) 6500/60 382 (400-1¼)
C CIRCLING 6740-1 553 (600-1) 6800-1 613 (700-1) 7040-2½ 853 (900-2½) 7260-3 1073 (1100-3)
COLORADO SPRINGS, COLORADO
Amdt 4A 17AUG17
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
RNAV (GPS) Y RWY 35R
SW-1, 12 AUG 2021 to 09 SEP 2021

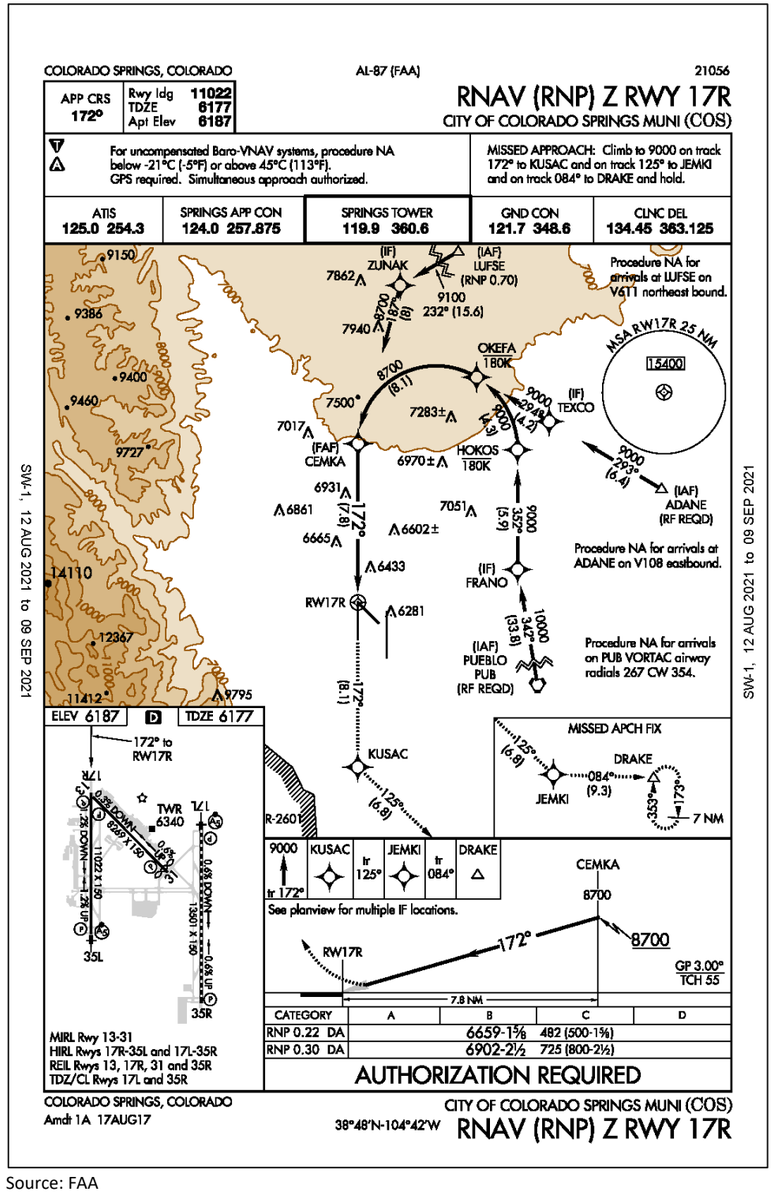
Source: FAA

Figure 2-23: Instrument Approach Plate – RNAV (RNP) RWY 17L


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
RNAV (RNP) Z RWY 17L
CITY OF COLORADO SPRINGS MUNI (COS)
APP CRS 172°
Rwy Idg 13501
TDZE 6187
Apt Elev 6187
For uncompensated Baro-VNAV systems, procedure NA below -21°C (-5°F) or above 44°C (112°F). GPS required.
MALSR
MISSED APPROACH: Climb to 9000 on track 172° to CEGIX and on track 130° to JEMKI and on track 084° to DRAKE and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
(IAF) LUFSE
(IF) JONOL
9100 228° (15.3)
Procedure NA for arrivals at LUFSE on V611 northeast bound.
SOGKO 180K
9000 295° (4.2)
(IF) REEFF
(FAF) ROCCK
ZIVAD 180K
9000 295° (4.8)
(IAF) ADANE (RF REQD)
Procedure NA for arrivals at ADANE on V108 eastbound.
(IF) WIPUN
MSA RW17L 25 NM
15400
RW17L
(IAF) FSHER (RF REQD)
Procedure NA for arrivals at FSHER on V244 westbound.
MISSED APCH FIX
CEGIX
JEMKI
DRAKE
7 NM
ELEV 6187
TDZE 6187
172° to RW17L
TWR 6340
MIRL Rwy 13-31
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31 and 35R
TDZ/CL Rwys 17L and 35R
VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 53).
See planview for multiple IF locations.
GP 3.00° TCH 57
7.7 NM
CATEGORY A B C D
RNP 0.15 DA 6557/40 370 (400-¾)
RNP 0.25 DA 6644/50 457 (500-1)
RNP 0.30 DA 6920-2 733 (800-2)
AUTHORIZATION REQUIRED
COLORADO SPRINGS, COLORADO
Amdt 2A 17AUG17
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
RNAV (RNP) Z RWY 17L
SW-1, 12 AUG 2021 to 09 SEP 2021

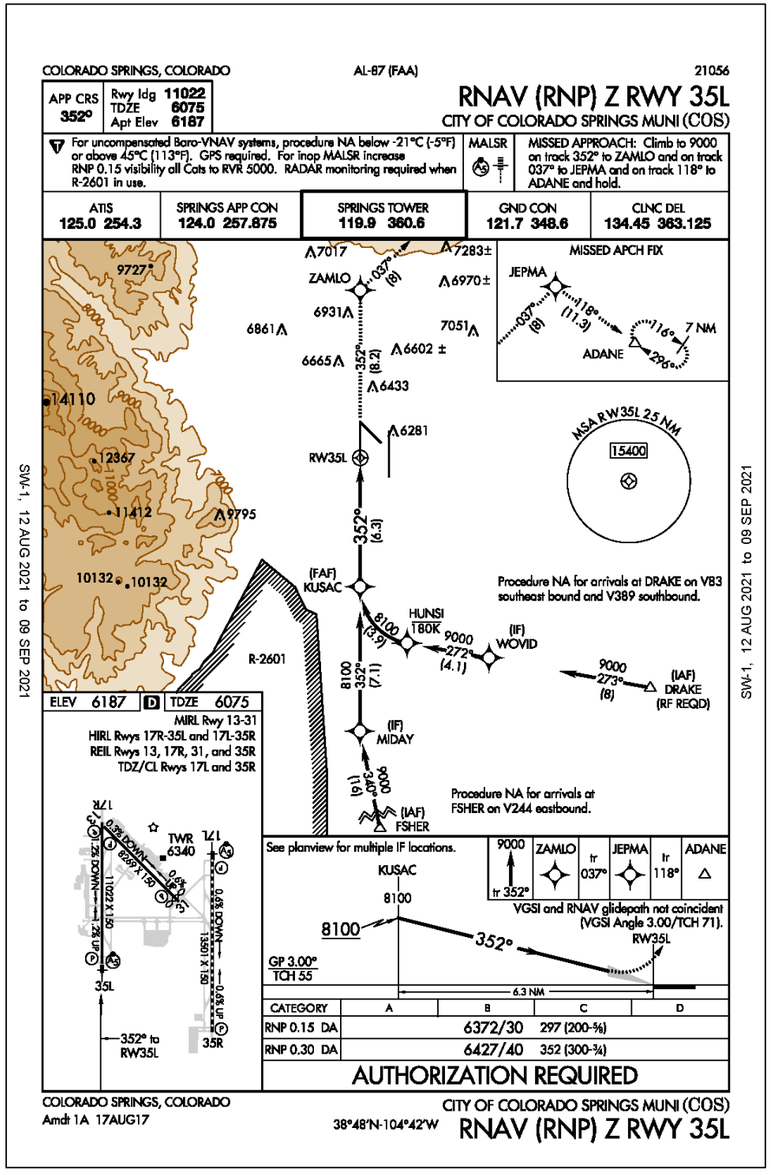
Source: FAA

Figure 2-24: Instrument Approach Plate – RNAV (RNP) RWY 17R


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
RNAV (RNP) Z RWY 17R
CITY OF COLORADO SPRINGS MUNI (COS)
APP CRS 172°
Rwy Idg 11022
TDZE 6177
Apt Elev 6187
For uncompensated Baro-VNAV systems, procedure NA below -21°C (-5°F) or above 45°C (113°F). GPS required. Simultaneous approach authorized.
MISSED APPROACH: Climb to 9000 on track 172° to KUSAC and on track 125° to JEMKI and on track 084° to DRAKE and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
(IF) ZUNAK
(IAF) LUFSE (RNP 0.70)
9100 232° (15.6)
Procedure NA for arrivals at LUFSE on V611 northeast bound.
OKEFA 180K
(IF) TEXCO
MSA RW17R 25 NM
15400
(FAF) CEMKA
HOKOS 180K
9000 295° (6.4)
(IAF) ADANE (RF REQD)
Procedure NA for arrivals at ADANE on V108 eastbound.
(IF) FRANO
(IAF) PUEBLO PUB (RF REQD)
Procedure NA for arrivals on PUB VORTAC airway radials 267 CW 354.
RW17R
KUSAC
MISSED APCH FIX
JEMKI
DRAKE
7 NM
R-2601
ELEV 6187
TDZE 6177
172° to RW17R
TWR 6340
MIRL Rwy 13-31
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31 and 35R
TDZ/CL Rwys 17L and 35R
See planview for multiple IF locations.
GP 3.00° TCH 55
7.8 NM
CATEGORY A B C D
RNP 0.22 DA 6659-1⅜ 482 (500-1⅜)
RNP 0.30 DA 6902-2½ 725 (800-2½)
AUTHORIZATION REQUIRED
COLORADO SPRINGS, COLORADO
Amdt 1A 17AUG17
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
RNAV (RNP) Z RWY 17R
SW-1, 12 AUG 2021 to 09 SEP 2021

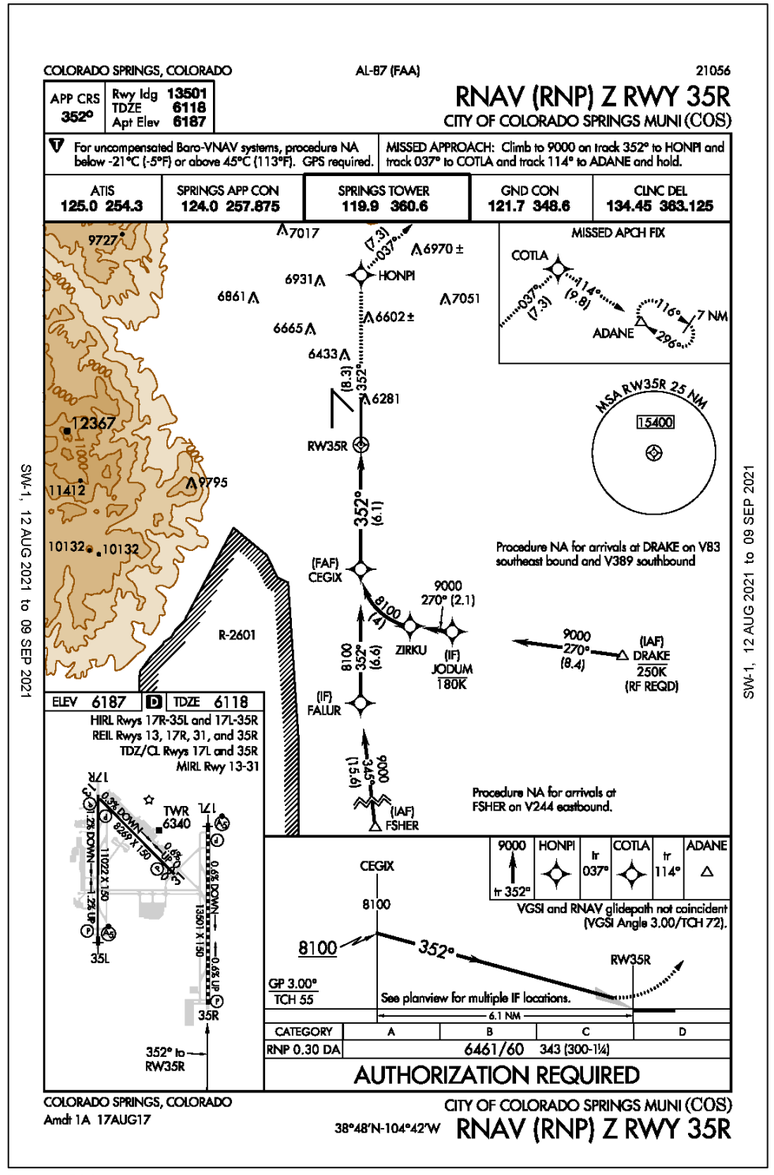
Source: FAA

Figure 2-25: Instrument Approach Plate – RNAV (RNP) RWY 35L


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
APP CRS 352°
Rwy Idg 11022
TDZE 6075
Apt Elev 6187
RNAV (RNP) Z RWY 35L
CITY OF COLORADO SPRINGS MUNI (COS)
For uncompensated Baro-VNAV systems, procedure NA below -21°C (-5°F) or above 45°C (113°F). GPS required. For inop MALSR increase RNP 0.15 visibility all Cats to RVR 5000. RADAR monitoring required when R-2601 in use.
MALSR
MISSED APPROACH: Climb to 9000 on track 352° to ZAMLO and on track 037° to JEPMA and on track 118° to ADANE and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
MISSED APCH FIX
JEPMA
ADANE
7 NM
ZAMLO
MSA RW35L 25 NM
15400
RW35L
352° (6.3)
KUSAC
(FAF)
HUNSI
180K
WOVID
(IF)
DRAKE
(IAF)
(RF REQD)
Procedure NA for arrivals at DRAKE on V83 southeast bound and V389 southbound.
R-2601
MIDAY
FSHER
Procedure NA for arrivals at FSHER on V244 eastbound.
ELEV 6187
TDZE 6075
MIRL Rwy 13-31
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31, and 35R
TDZ/CL Rwys 17L and 35R
TWR 6340
11022 X 150
13501 X 150
35L
35R
352° to RW35L
See planview for multiple IF locations.
VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 71).
GP 3.00° TCH 55
6.3 NM
CATEGORY A B C D
RNP 0.15 DA 6372/30 297 (200-⅝)
RNP 0.30 DA 6427/40 352 (300-¾)
AUTHORIZATION REQUIRED
COLORADO SPRINGS, COLORADO
Amdt 1A 17AUG17
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
RNAV (RNP) Z RWY 35L
SW-1, 12 AUG 2021 to 09 SEP 2021

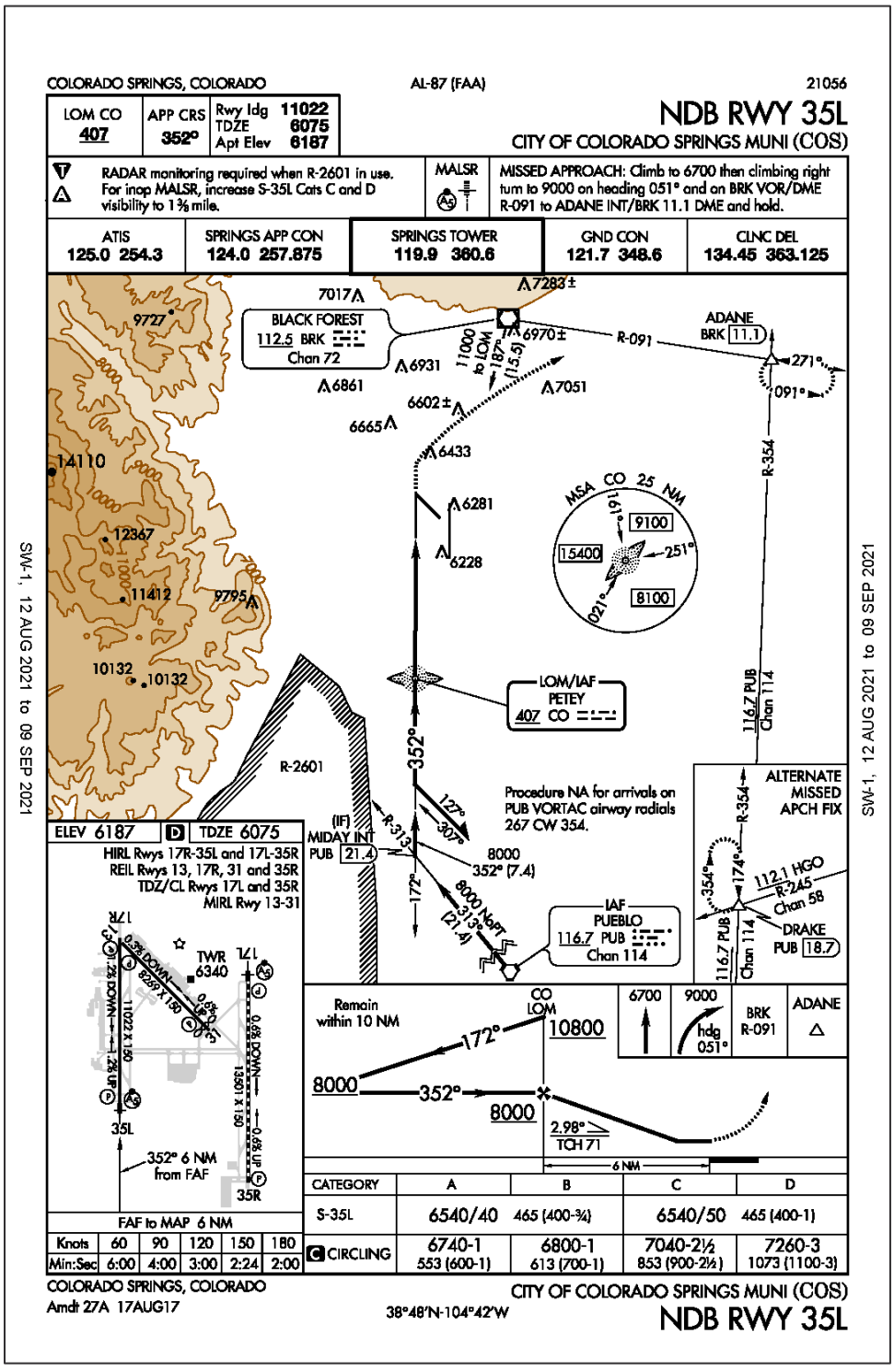
Source: FAA

Figure 2-26: Instrument Approach Plate – RNAV (RNP) RWY 35R



Source: FAA

Figure 2-27: Instrument Approach Plate – NDB RWY 35L


COLORADO SPRINGS, COLORADO
AL-87 (FAA)
21056
NDB RWY 35L
CITY OF COLORADO SPRINGS MUNI (COS)
LOM CO 407
APP CRS 352°
Rwy Idg 11022
TDZE 6075
Apt Elev 6187
RADAR monitoring required when R-2601 in use. For inop MALSR, increase S-35L Cats C and D visibility to 1¾ mile.
MALSR
MISSED APPROACH: Climb to 6700 then climbing right turn to 9000 on heading 051° and on BRK VOR/DME R-091 to ADANE INT/BRK 11.1 DME and hold.
ATIS 125.0 254.3
SPRINGS APP CON 124.0 257.875
SPRINGS TOWER 119.9 360.6
GND CON 121.7 348.6
CLNC DEL 134.45 363.125
BLACK FOREST 112.5 BRK Chan 72
ADANE BRK 11.1
R-091
R-354
MSA CO 25 NM
9100
15400
8100
LOM/IAF PETEY 407 CO
116.7 PUB Chan 114
R-2601
352°
Procedure NA for arrivals on PUB VORTAC airway radials 267 CW 354.
ALTERNATE MISSED APCH FIX
(IF) MIDAY INT PUB 21.4
8000 352° (7.4)
IAF PUEBLO 116.7 PUB Chan 114
112.1 HGO R-245 Chan 58
DRAKE PUB 18.7
ELEV 6187
TDZE 6075
HIRL Rwys 17R-35L and 17L-35R
REIL Rwys 13, 17R, 31 and 35R
TDZ/CL Rwys 17L and 35R
MIRL Rwy 13-31
TWR 6340
11022 X 150
13501 X 150
352° 6 NM from FAF
Remain within 10 NM
CO LOM 10800
8000
352°
172°
2.98°
TCH 71
6 NM
6700
9000 hdg 051°
BRK R-091
ADANE
FAF to MAP 6 NM
Knots 60 90 120 150 180
Min:Sec 6:00 4:00 3:00 2:24 2:00
CATEGORY A B C D
S-35L 6540/40 465 (400-¾) 6540/50 465 (400-1)
CIRCLING 6740-1 553 (600-1) 6800-1 613 (700-1) 7040-2½ 853 (900-2½) 7260-3 1073 (1100-3)
COLORADO SPRINGS, COLORADO
Amdt 27A 17AUG17
CITY OF COLORADO SPRINGS MUNI (COS)
38°48'N-104°42'W
NDB RWY 35L
SW-1, 12 AUG 2021 to 09 SEP 2021
SW-1, 12 AUG 2021 to 09 SEP 2021

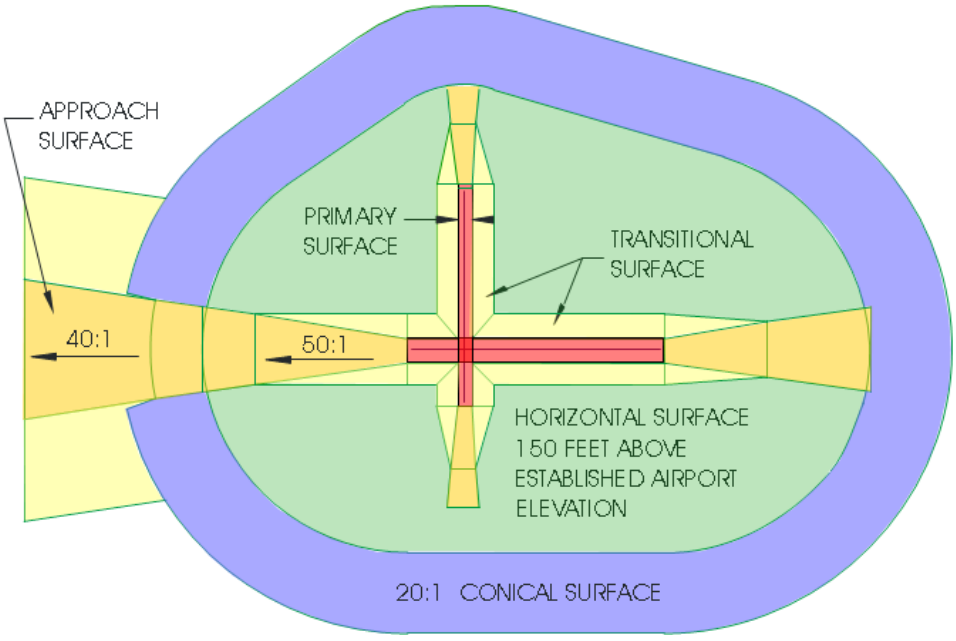
Source: FAA

Part 77 Airspace Surfaces

Federal Aviation Regulations (FAR) Part 77, *Objects Affecting Navigable Airspace*, is a tool used to protect the airspace over/around a given airport, and each of its runway approaches, from potential obstructions to air navigation. It is important to note that as a federal regulation, all airports included in the NAS are subject to the requirements of Part 77. To determine whether an object is an obstruction to air navigation, Part 77 establishes several imaginary airspace surfaces in relation to an airport and to each runway end. The dimensions and slopes of these surfaces depend on the configuration and approach categories of each airport's runway system. The size of the imaginary surfaces depends largely upon the type of approach to the runway in question. The principal imaginary surfaces are generally described below and are illustrated in **Figure 2-28**.

- Primary Surface: Longitudinally centered on the runway at the same elevation as the nearest point on the runway centerline.
- Horizontal Surface: Located 150 feet above the established airport elevation, the perimeter of which is established by swinging arcs of specified radii from the center of each the primary surface end, connected via tangent lines.
- Conical Surface: Extends outward and upward from the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.
- Approach Surface: Longitudinally centered on the extended centerline and extending outward and upward from each runway end at a designated slope based on the runway approach.
- Transitional Surface: Extends outward and upward at a right angle to the runway centerline at a slope of 7:1 up to the horizontal surface.

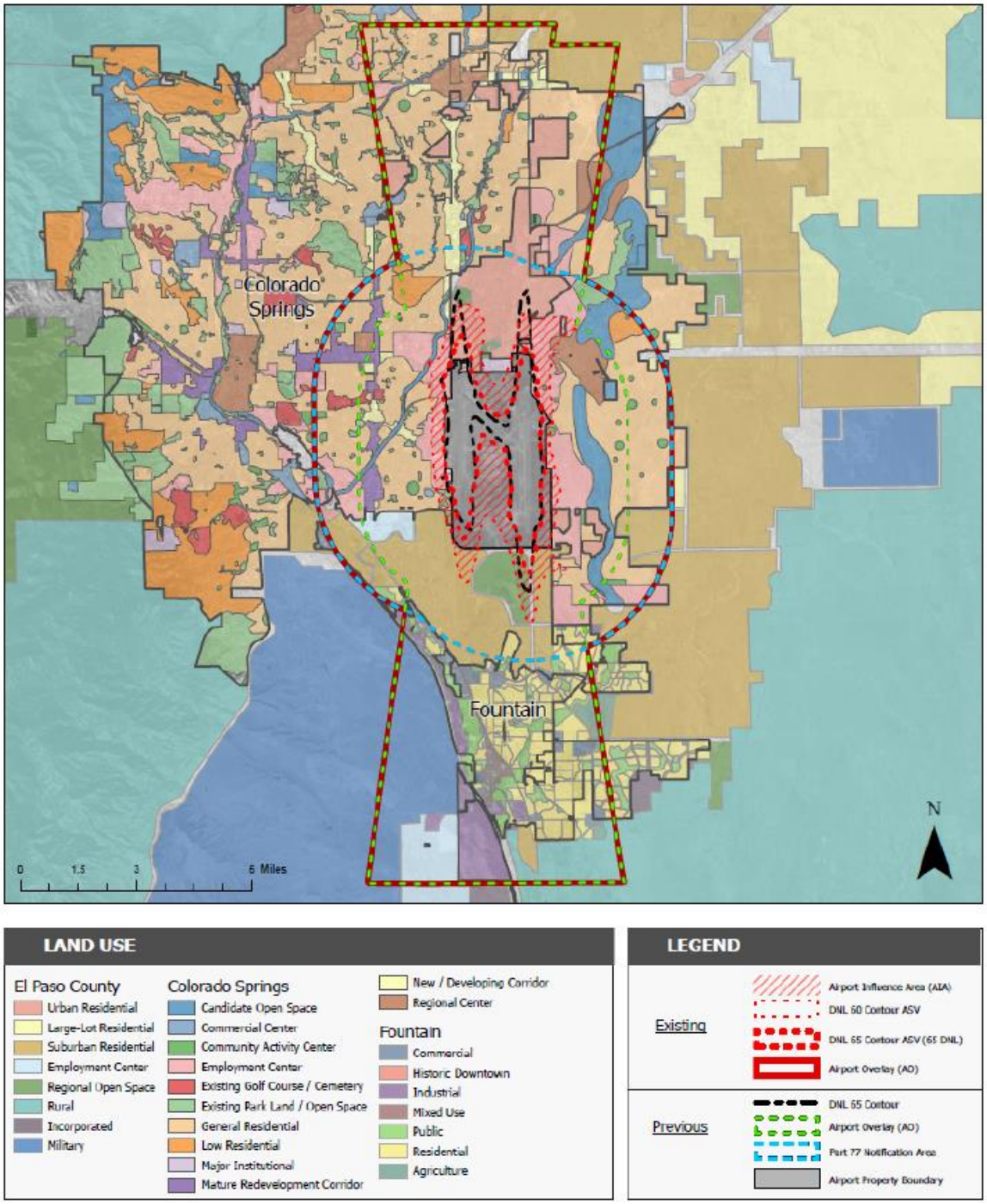
Figure 2-28: FAR Part 77 Plan View



Source: FAA

Figure 2-29 illustrates the limits of the Airport's Part 77 airspace surfaces determined by the operational types and approaches presented in previous sections and depicted as the Airport Overlay (AO). Note that greater details related to Part 77 are presented in the ALP found in **Chapter Six: Airport Plans**.

Figure 2-29: COS FAR Part 77 Airspace Plan View



Source: Colorado Springs Airport, 2020 Land Use Study

Airport Environs

This section includes demographic and economic data of the City of Colorado Springs and a brief discussion of other factors such as land use planning and zoning, as they relate to COS.

Community Demographics

The Colorado Department of Local Affairs estimates the City of Colorado Springs' 2020 population is 478,961, while the population for El Paso County is estimated to be 730,395. These figures indicate population growth of 62,534, or 15.0 percent, for the City, and 108,132, or 17.4 percent, for the County since 2010. **Chapter 3 – Aviation Activity Forecast** provides a more detailed review of demographic information for the Colorado Springs region.

Regional Growth

According to the recently completed City of Colorado Springs comprehensive plan (also known as PlanCOS), it is forecasted that the airport market area (El Paso and Teller counties) will grow to nearly 1 million residents and support more than 500,000 jobs by 2040. This is an increase of approximately 300,000 people and 146,000 jobs from 2015 to 2040. PlanCOS anticipates that the City of Colorado Springs itself will accommodate roughly 65 percent of this total growth, resulting in a City population of over 600,000 by 2040. While actual growth will vary, development at some level is certain and the region is already planning for this growth.

Regional Airports

COS exists within a regional airport system as the principal facility that serves commercial airline passengers, cargo operations, military personnel, and general aviation business users. While COS supports general aviation activity, there are several other airports in the vicinity that focus on recreational flying, flight instruction, and experimental aircraft activity. The most significant alternative airport in the region, Meadow Lake Airport (FLY) in Falcon, is home to over 400 based aircraft, a large percentage of which are single-engine aircraft. Other airstrips including Springs East Airport (C04) and Calhan Airport (5V4) are also in the vicinity of COS and serve a small slice of the aviation community in the Colorado Springs region. As COS's activity profile continues to evolve, there are airports in the region are available to accommodate and support general aviation activity from smaller aircraft, ensuring that these users will continue to have space to operate and enjoy the benefits of aviation.

Local Comprehensive Planning

In 2019, the City of Colorado Springs published its most recent comprehensive plan, PlanCOS. This plan was created to recognize and respond to evolving and growing markets, private initiatives, public investments, and innovation within the region. PlanCOS identified areas where significant change is anticipated, the

majority of which expected to occur on the east side of the City and in proximity to COS, to a large degree pursuant to the Banning Lewis Ranch Annexation Amendment in 2018. The plan recognizes that the Airport serves as the first impression for many of the region's visitors and is a crucial asset to the current and future growth of the City and region. PlanCOS recommends several goals that can be applied to future development at the Airport:

- Support the growth and adaptation of Colorado Springs Airport to maintain its economic value as an air service provider for the City and region, and to strengthen its role as an integrated hub for economic development. *PlanCOS - Strategy TE-1.D-5*
- Identify, accommodate, and provide supportive zoning for key sites for industrial uses with good multimodal access to highways, railroads, and the Airport. *PlanCOS – Strategy TE-2.A-1*
- Specifically continue to invest in and adapt facilities and services, including multimodal transportation improvements, in order to increase the number, range and cost-competitiveness of airline flights to and from the Colorado Springs Airport. *PlanCOS – Strategy SC-1.A-7*
- Provide convenient and inexpensive transit connections between the Colorado Springs Airport and key locations within the City. *PlanCOS – Strategy SC-2.B-5*

Existing Land Use and Zoning

As PlanCOS and other Airport goals and associated development progresses, land use and zoning considerations will be become ever more important for ensuring the Airport's land area and airspace is protected.

Thus, a Land Use Compatibility Study was completed for COS in 2020 to evaluate the development of the Airport and contextualize the future plans of area jurisdictions. It was concluded that existing land use and zoning ordinances for the City, County, and the City of Fountain (south of the Airport) provide adequate protection for the Airport and its airspace, but that all proposed changes should be reviewed to ensure the protection of the Airport and its operational capabilities.

More information about this study can be found later in this chapter under the Noise and Compatible Land Use section.

Environmental Review

Local, state, and federally regulated natural resources that exist on and around the Colorado Springs Airport can have the potential to impact airport activities and future improvements. Permitting or environmental review is often required for future projects that impact regulated environmental resources; therefore, it

is important to conduct a review of those resources in their current condition and in the current regulatory environment. This environmental overview follows the framework of the environmental impact categories listed in FAA Order 1050.1, *Environmental Impacts: Policies and Procedures*.

The scope, location, and feasibility of future projects could be impacted by the presence of environmental resources, as many natural resources are protected by local, state, and federal regulations. Construction-related permits also contain conditions and mitigation measures that must be met prior to the start of a project; these can impact the cost and schedule of a project.

Additionally, the natural environment can influence the location of improvement projects. The cost of construction and permitting can be prohibitive when the proposed development plan impacts environmental resources and/or uses land with physical constraints (e.g., steep slopes, bedrock, or poor soils). By identifying these resources early in the planning process, project alternatives can be selected to avoid these resources or, in cases where avoidance is not possible, minimize the impacts.

Natural resource information was obtained from municipal, state, and federal websites; and reports from governmental agencies, Colorado Springs Airport, and Jviation, a Woolpert Company. The following sources were utilized in the preparation of this document:

- Colorado Parks & Wildlife
- City of Colorado Springs
- El Paso County
- U.S. National Park Service
- U.S. Fish and Wildlife Service
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency (EPA)
- U.S. Natural Resources Conservation Service
- U.S. Department of Transportation
- U.S. Federal Aviation Administration
- Federal Emergency Management Agency
- Previous Airport Environmental Documents

This section addresses environmental factors that specifically apply to COS according to FAA Advisory Circular 150/5070-6B, *Airport Master Plans*. Current information from federal, state, and local agencies concerning environmental conditions on and near COS have been reviewed and are presented below.

FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, and FAA Order 5050.4B, *National Environmental Policy Act: Implementation Instruction for Airport Actions*, address specific environmental categories evaluated in environmental documents in accordance with the National Environmental Policy

Act (NEPA). The sections below provide an inventory of the applicable environmental categories as related to COS.

Air Quality

An air quality analysis for federally funded projects must be prepared in accordance with applicable air quality statutes and regulations:

- Clean Air Act (CAA), as amended,42 U.S.C. 7401-7671;
- EPA air regulations, 40 CFR Parts 50 and 51; and
- Colorado Department of Public Health and Environment, 5 CCR 1001-14.

Section 176 of the CAA Amendments of 1977 states, in part, that no federal agency shall engage in; support in any way; provide financial assistance for; or license, permit, or approve any activity that does not conform to a State Implementation Plan (SIP) for meeting air-quality standards after it has been approved or promulgated under Section 110 of that Act. It is the FAA's responsibility to ensure that federally funded airport actions conform to state plans for controlling area-wide air-pollution impacts. development

The CAA, which is monitored by the EPA, is the predominant statute (along with the NEPA) that regulates actions with the potential to affect air quality. The CAA established National Ambient Air Quality Standards (NAAQS) for six pollutants, specifically termed "criteria pollutants."

In accordance with the CAA, all areas within the State of Colorado are designated with respect to the NAAQS as being in attainment, nonattainment, maintenance, or unclassifiable. An area with air quality better than the NAAQS is designated attainment, while an area with air quality worse than the NAAQS is designated nonattainment. The EPA previously designated El Paso County as a nonattainment areas for criteria pollutants (1971) for carbon monoxide (1971); however, the county is currently in maintenance for this pollutant and in attainment for the remaining criteria air pollutants of carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead.

Through Colorado's SIP, the EPA approved a carbon monoxide redesignation request and maintenance plan for the Colorado Springs area on August 25, 1999. The plan was revised in 2000, 2004, and 2009. The 2009 revision extended the maintenance year through 2020. At this time, a fifth revision has not been released.

Attainment of the NAAQS for carbon monoxide is demonstrated when monitoring data for each site show no more than one exceedance per year of the 8-hour (9 ppm) and 1-hour (35 ppm) standards. The 2009 revision states the 8-hour standard has not been exceeded in the Colorado Springs area since 1989. The 1-hour standard has not been exceeded since 1979. Monitoring data for 1999-2008 demonstrates that the Colorado Springs attainment/maintenance area continues

to attain/maintain the national standard for carbon monoxide as required by 40 CFR 50.8.

Biological Resources

Both federal- and state-listed threatened and endangered wildlife species receive additional regulatory protection under the U.S Endangered Species Act of 1973 which is managed by the U.S. Fish and Wildlife Service (USFWS). State-listed species in Colorado are regulated under the State Wildlife Action Plan, managed by Colorado Parks & Wildlife.

The USFWS, through use of its Information for Planning and Consultation (IPaC) indicated the possible presence of the following federally protected species:

- Eastern Black Rail (*Laterallus jamaicensis*) - No critical habitat.
- Piping Plover (*Charadrius melodus*) - Only consider if project includes water-related activities and/or use in the N. Platte, S. Platte, and Laramie River Basins.
- Whooping Crane (*Grus americana*) - Only consider if project includes water-related activities and/or use in the N. Platte, S. Platte, and Laramie River Basins.
- Greenback Cutthroat Trout (*Oncorhynchus clarkia stomias*) - No critical habitat.
- Pallid Sturgeon (*Scaphirhynchus albus*) - Only consider if project includes water-related activities and/or use in the N. Platte, S. Platte, and Laramie River Basins.
- Ute Ladies'-tresses (*Spiranthes diluvialis*) - No critical habitat.
- Western Prairie Fringed Orchid (*Platanthera praeclara*) - Only consider if project includes water-related activities and/or use in the N. Platte, S. Platte, and Laramie River Basins.

An Ecological Resource Survey was completed in 2018 for the Peak Innovation Park. Although, the survey did not include the entire airport property, it gives an indication of what habitat and species may be present at the Airport. A Survey of Critical Biological Resources was also completed for El Paso County in 2001. This Survey is now dated at more than 20 years old; however, again it indicates what resources may be present in the area.

According to the Ecological Resource Survey, the presence of several of the federally protected species on the IPaC report can be ruled out due to lack of habitat at the Airport. This includes the whooping crane and western prairie fringed orchid. The following conclusions were made for the remaining species listed on the IPaC:

- Eastern Black Rail (*Laterallus jamaicensis*) – Not included in the Survey.

- Piping Plover (*Charadrius melodus*) – Due to the lack of sandbars or mud-flats in the vicinity of the project, Piping Plovers are unlikely to occur.
- Greenback Cutthroat Trout (*Oncorhynchus clarkia stomias*) - Not included in the Survey.
- Pallid Sturgeon (*Scaphirhynchus albus*) - Not included in the Survey.
- Ute Ladies'-tresses (*Spiranthes diluvialis*) - The property is not within Spiranthes designated Critical Habitat.

Other species included in the Ecological Resource Survey include:

- Western Burrowing Owl (state threatened) – May be present in prairie dog colonies
- Bald Eagles (state threatened) - The Airport is located outside of the Colorado Parks and Wildlife recommended seasonal restriction buffer (½ mile). At the time of the inspection, no eagles were observed on or adjacent to the property. Additionally, no nest, forage, or roost sites were identified on the property.
- Mountain Plover (state concerned species) – May be present in prairie dog colonies
- Piping Plover (federally threatened, state threatened) - Due to the lack of sandbars or mud-flats in the vicinity of the Airport, Piping Plovers are unlikely to occur.
- Plains Sharp-Tailed Grouse (state endangered) - No known populations of the Plains Sharp-Tailed Grouse are known to occur in proximity to the Airport.
- Lesser Prairie Chicken (state threatened) - No known populations of the Lesser Prairie Chicken are known to occur in proximity to the Airport.
- Ferruginous Hawk (state concerned) - At the time of the survey, no ferruginous hawks were observed.
- Preble's Meadow Jumping Mouse (federally threatened, state threatened) – The Airport is located within the FWS Block Clearance Zone for Colorado Springs.
- Black-tailed Prairie Dog - several active colonies of prairie dogs were observed during the field survey.

Although the IPaC and Ecological Resource Survey found the presence or absence of several species at the Airport. a biological survey would be required to verify future habitat and species at the Airport prior to the start of a construction project.

Lastly, a Survey of Critical Biological Resources was completed for El Paso County. Within this survey, the Airport was ranked for biodiversity, protection urgency,

and management urgency. The Airport was ranked as B2 (very high significance) for biodiversity as the Airport contains big bluestem-prairie sandreed tallgrass. The Airport's tallgrass community is the largest known occurrence of this tallgrass community in Colorado. The Airport was ranked as P1 (very high urgency) for protection urgency. The easternmost portion is part of the historic Banning-Lewis Ranch and portions of the City Airport Authority property are planned for development; housing subdivisions are rapidly encroaching and have recently decreased the tallgrass prairie acreage. Impacts to the tallgrass should be considered when native ground is planned for development.

The Survey of Critical Biological Resources also included an analysis of the Fountain and Jimmy Camp Creeks, which receives stormwater from the Airport. The Creeks were ranked with moderate significance for biodiversity as the Arkansas darter, a globally-vulnerable fish species, is present within the Creeks. They were also ranked with high urgency for protection; changes in the hydrologic regime of Fountain Creek and development on the banks of Fountain and Jimmy Camp creeks have the potential to extirpate Arkansas darters from these reaches. Lastly, the Creeks were ranked with high urgency for management as the new management actions are needed to prevent the loss of the Arkansas darter from the stream reaches. Changes to Airport operations or development plans that impact the quality of stormwater runoff into these Creeks should be considered.

Research has posited that an increase in atmospheric greenhouse gas (GHG) emissions is significantly affecting the Earth's climate. This is based upon a scientific record that includes contributions from the United States Global Change Research Program (USGCRP).This program was mandated by Congress in the Global Change Research Act to "assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change."[4] The scientific assessments of the USGCRP, the National Research Council (NRC), and the Intergovernmental Panel on Climate Change (IPCC), informed a 2009 decision by the EPA concluding that changes to the climate caused by elevated concentrations of GHG in the atmosphere endanger the public health and public welfare of current and future generations.[5] In 2015, EPA acknowledged more recent scientific assessments that "highlight the urgency of addressing the rising concentration of carbon dioxide (CO_2) in the atmosphere."[6]

The FAA has not established a significance threshold for climate impacts. According to the Council on Environmental Quality (CEQ), it is very difficult to link specific climatological changes to a particular project. Since only a very small percentage of CO_2 emissions originate from aviation sources, emissions are not expected be a significant concern within the planning period. However, the

[4] USFWS, HYPERLINK "https.//www.fws.gov/mountain-prairie/es/grizzlyBearHistoryHabitatDiet.php"
[5] Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66496 (December 15, 2009).
[6] EPA< Final Rule for Carbon Pollution Emission Guidelines for Existing Stationary Sources Electric Utility Generating Units, 80 Fed. Reg. 64661, 64677 (October 23, 2015).

Airport can employ and encourage operators at the Airport to reduce their emissions and the resulting GHG.

A larger discussion regarding the changing climate and the airport's resiliency to this change can be found in the Appendices to this report.

Department of Transportation Act Section 4(f)

Section 4(f) of the U.S. Department of Transportation Act of 1966 requires the Federal Transportation Authority (FTA) and other U.S. Department of Transportation (USDOT) agencies to consider alternatives to developing publicly-owned parks, recreation areas (including trails), wildlife and water fowl refuges, or public and private historic properties, unless there is no feasible and prudent alternative to that use and the action includes all possible planning to minimize harm to the property resulting from such a use (see 23 CFR Part 774).

Numerous city parks are located within the City of Colorado Springs and to the west of the Airport. The nearest city park is the Sky View Community Park and Sports Complex, located adjacent to the Airport and along S. Powers Boulevard. Section 4(f) resources are also located to the north of the Airport and within Peterson SFB. Peak View Park, associated with Peterson SFB, is located adjacent to and east of the Airport. The Bluestem Prairie Open Space is also located adjacent to and south of the Airport. **Figure 2-30** displays the location of the Section 4(f) resources in proximity to the Airport.

Historic sites are also considered a Section 4(f) resource and are discussed within the Historical, Architectural, Archeological, and Cultural Resources section of this section.

Figure 2-30: Section 4(f) Resources Near COS

Source: U.S. Department of Transportation

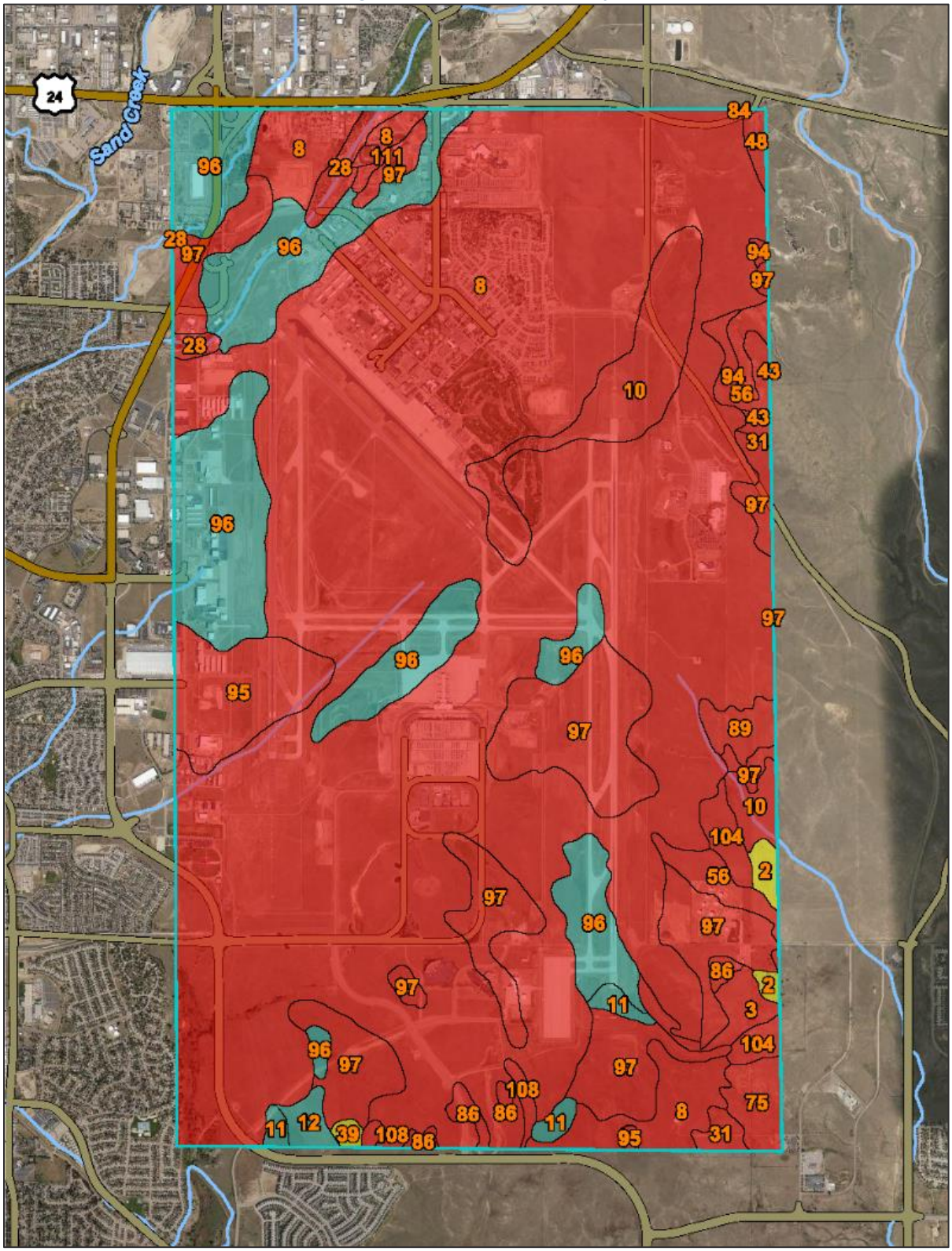
Farmlands

According to FAA Order 1050.1f, farmlands are defined as those agricultural areas considered important and protected by Federal, state, and local regulations. Important farmlands include all pasturelands, croplands, and forests (even if zoned for development) considered to be prime, unique, or of statewide or local importance. The Farmland Protection Policy Act (7 U.S.C. 4201-4209), through the Natural Resources Conservation Service (NRCS), regulates federal action with the potential to convert important farmland to non-agricultural uses.

The NRCS's Web Soil Survey shows a large portion of the airfield (approximately 85 percent) is designated as not prime farmland (see areas shaded in red in **Figure 2-31)**. Areas designated as prime farmland (blue shaded areas) have already been developed with airport-related projects, limiting any potential use for farming.

For proposed improvement projects within areas of farmland importance, it is important to note that conversion of farmlands may require NRCS review. The NRCS uses a scoring of impact system called the Farmland Conversion Impact Rating form; this is done using Form AD-1006 (03-02). The results of this scoring will determine the significance of the impacts and the need for further actions, including mitigation.

Figure 2-31: USDA Soil Survey



Source: USDA

Hazardous Materials, Solid Waste, and Pollution Prevention

Hazardous materials, solid waste, and pollution prevention are most commonly regulated under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), Pollution Prevention Act of 1990, and the Resource Conservation and Recovery Act of 1976 (RCRA). Several other Executive Orders also regulate hazardous materials, solid waste, and pollution prevention (see FAA Order 1050.1f Desk Reference for a full list). Additionally, the Colorado Department of Public Health and Environment (CDPHE), Hazardous Materials and Waste Management Division is responsible at the state level for mitigation related to this specific environmental area.

The terms hazardous material, hazardous waste, and hazardous substance are often used interchangeably when informally referring to contaminants, industrial wastes, dangerous goods, and petroleum products. Solid waste, as defined by RCRA, is generally any discarded material that meets specific regulatory requirements and can include such items as refuse and scrap metal, spent materials, chemical by-products, and sludge from industrial and municipal wastewater and water treatment plants. Lastly, FAA Order 10501f, describes pollution prevention as methods used to avoid, prevent, or reduce pollutant discharges or emissions through strategies such as using fewer toxic inputs, redesigning products, altering manufacturing and maintenance processes, and conserving energy.

The Airport and its tenants maintain numerous fuel and deicing tanks (both above and below ground). All tanks are contained and maintained per the Airports Spill Prevention Control and Countermeasure (SPCC) Plan. The SPCC plan provides guidance and measures to minimize the potential for a discharge and to the hazards to human health and the environment from an unplanned discharge

Additionally, the ARFF facilities at Peterson SFB frequently use and dispose of hazardous materials as part of training exercises on the north side of the Airport. These actions are regulated under the SFB.

Waste sites on the Airport include a glycol pond for storing deicing runoff and discussed previously in this chapter. A landfill previously existed on the east side of the long-term passenger parking area and was redistributed to areas south of Runway 35L. This landfill contained refuse from both Airport and military uses; thus, soils should be analyzed prior to any additional construction on these sites. The most recent correspondence, dated March 2007, related to the landfills confirmed compliance with a CDPHE inspection and requests to reseed the area and dispose of a small amount of debris near the site at a permitted facility.

Future development near hazardous material or solid waste sites should be examined for potential impacts. Remediation plans may need to be developed if sites were to be impacted. The Airport should also consider construction practices that reduce the amount of pollution created during construction, from equipment, and those emitted by operation.

Historical, Architectural, Archeological, and Cultural Resources

Section 106 of the National Historic Preservation Act (36 CFR 800) (NHPA) requires federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation reasonable opportunity to comment on such efforts. Projects subject to Section 106 must consult with the State Historic Preservation Officer, Tribal Historic Preservation Officer(s), and ACHP to determine if the project has the potential to affect historic properties already listed on or eligible for the National Register of Historic Places (NRHP) and what, if any, alternatives exist to avoid, minimize or mitigate the adverse effect(s) to National Register and National Register-eligible properties.

The former Colorado Springs Airport site, now part of Peterson SFB, was listed as a Historic District in 1988. Four of these buildings, the terminal building, City Hangar, Broadmoor Hangar, and Spanish House/Caretakers Residence, were included in the NRHP in November 1996. A fifth building is included in the district but is not in the NHRP due to its age and lack of use during the municipal airport's original use period from 1926-1945.

Any proposed projects that could potentially impact the historic district or NRHP buildings would require additional analysis. Further, future projects proposed on undisturbed ground may require a cultural resource survey to verify the presence or absence of buried archaeological features.

Natural Resources and Energy Supply

As stated in the FAA Order 1050.1f Desk Reference, as an impact category, natural resources and energy supply provides an evaluation of a project's consumption of natural resources (such as water, asphalt, aggregate, wood, etc.) and use of energy supplies (such as coal for electricity; natural gas for heating; and fuel for aircraft, commercial space launch vehicles, or other ground vehicles). Consumption of natural resources and use of energy supplies may result from construction, operation, and/or maintenance of the proposed action or alternative(s).

The existing energy used at COS is typical of other similar-sized commercial service airports. The buildings and lighting facilities respond to the demand which is triggered principally by airport operations. Energy is provided by Colorado Springs Utilities. Fuel consumption for aircraft will remain generally the same, unless a significant increase in demand occurs. The expected modest growth rate, combined with the minor increases in electrical demand, will not jeopardize the future availability of these resources to the airport or the community. Additionally, only common construction machinery and methods are needed to construct projects as their implemented, putting no continued burden on the area's ability to supply gasoline or diesel fuel. Future improvements to facilities at the Airport will likely result in greater fuel efficiency as a result of improvements in architectural and mechanical equipment and materials.

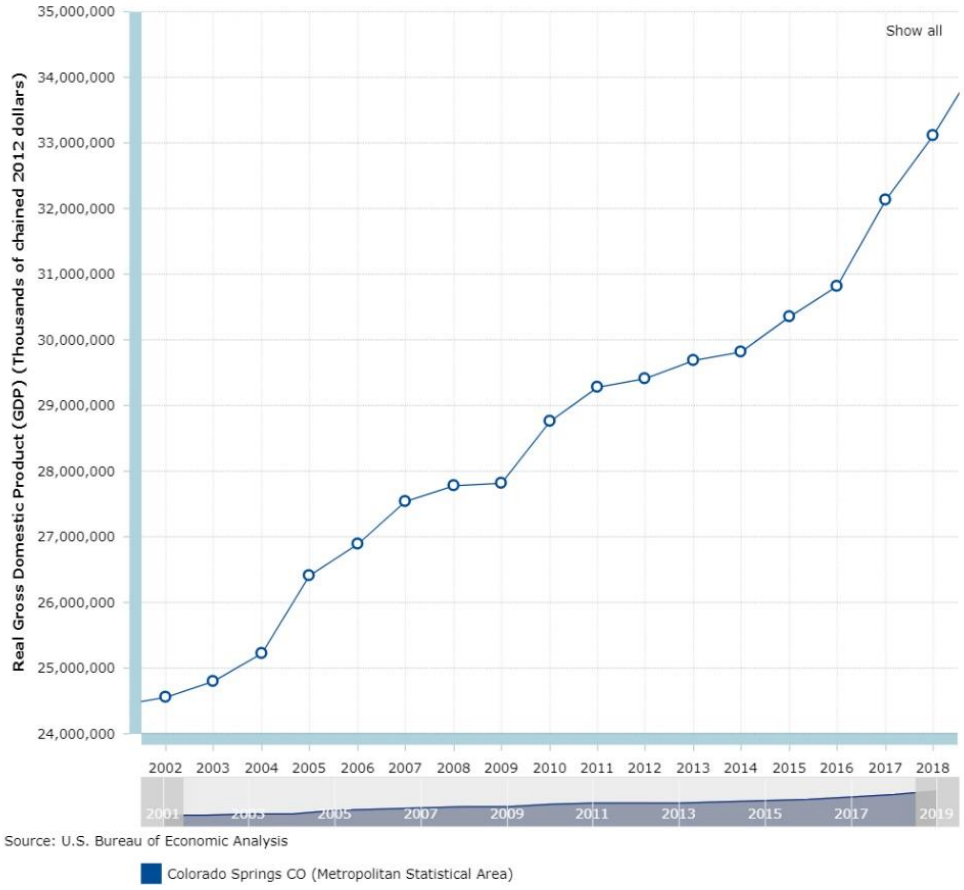
A more detailed discussion regarding energy resiliency can be found in the Appendices of this report.

Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks

Socioeconomics is an umbrella term used to describe aspects of a project that are either social or economic in nature. A socioeconomic analysis evaluates how elements of the human environment, such as population, employment, housing, and public services, might be affected by the proposed action and alternative(s).[7] Economic activity and income, employment, population and housing, public services, and social conditions are all indicators of an area's baseline socioeconomic conditions.

According to the Bureau of Economic Analysis (BEA), the gross domestic product for the City of Colorado Springs was $34.3 billion in 2019, continuing the historical upward trend (see **Figure 2-32**). The BEA also reports the personal income for the same area was $38.1 billion in 2019, again a continuation of an upward trend (see **Figure 2-33**).

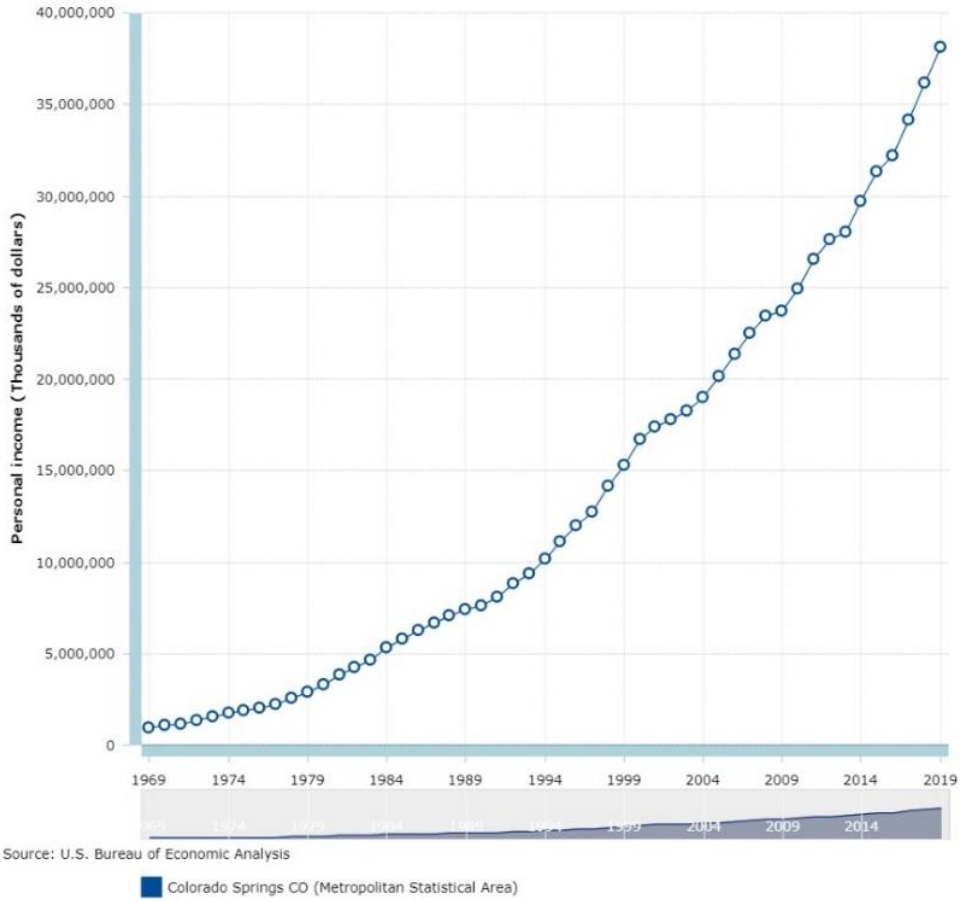
Figure 2-32: Gross Domestic Product for Colorado Springs



Source: U.S. Bureau of Economic Analysis, 2019

[7] FAA, FAA Order 1050.1f, Desk Reference, 201518.1

Figure 2-33: Personal Income Summary for Colorado Springs



Source: U.S. Bureau of Economic Analysis, 2019

The U.S. Bureau of Labor Statistics reports that the unemployment rate for the City of Colorado Springs in July of 2021 was 6.2 percent, this is slightly higher than the national average of 5.7 percent, for the same time period. Of those employed, a majority of employees work within the professional/business services and government related jobs. **Table 2-20** displays the top employment categories in July of 2021.

Table 2-20: Employment by Major Section

Employment Area	Number in Thousands (July 2021)
Professional and business services	51.9
Government	51.2
Trade, transportation, and utilities	44.9
Education and health services	43.7
Leisure and hospitality	39.1
Mining, logging, and construction	18.9
Financial activities	18.7

Employment Area	Number in Thousands (July 2021)
Leisure and hospitality	18.1
Manufacturing	12.1
Information	5.2

Source: U.S. Bureau of Labor Statistics, 2021

Environmental Justice

The EPA defines environmental justice as:

> "…the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."

Essentially, environmental justice doctrine attempts to prevent the exposure of environmental negligence to disproportionally affected communities (low-income and communities of color). Throughout US history, polluting factories, landfills, and highways were built near low-income and majority-minority communities, sparing majority-white, upper- or middle-class neighborhoods from the negative impacts. Environmental Justice serves to prevent such policies from continuing.

The U.S. Census Bureau reports that in 2019, the population of Colorado Springs is comprised of a mix of races. A majority of residents identified as "White"; "Hispanic or Latino" is the second-largest racial group. **Table 2-21** breakdowns the racial makeup of Colorado Springs.

Table 2-21: Race Origins

Race Origin	Percent of Population
White alone, not Hispanic or Latino, percent	68.60%
Hispanic or Latino, percent(b)	17.60%
Black or African American alone, percent(a)	6.50%
Two or More Races, percent	5.90%
Asian alone, percent(a)	2.90%
American Indian and Alaska Native alone, percent(a)	0.80%
Native Hawaiian and Other Pacific Islander alone, percent(a)	0.30%

Source: U.S. Census Bureau, 2019

Environmental justice actions also protect aging and low-income populations. The U.S. Census bureau reports that, in 2019, 13.4 percent of the population is over 65 and 11.7 percent of the population is living in poverty.

Children's Environmental Health and Safety Risks

Federal agencies have been directed through Executive Order 1045, *Protection of Children from Environmental Health Risks,* to identify and assess health and safety risks that may disproportionately affect children. Environmental health and safety risks include hazards attributable to products or substances that a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, soil, or products they might use or be exposed to. The U.S. Census Bureau reports that in 2019, 23.2 percent of the population of Colorado Springs was under the age of 18, with 6.5 percent under the age of 5.

As the Airport considers future development projects that may include land acquisitions and/or changes to land use, it should examine the impacts to population, employment, housing, and public services. Land uses near the north and west sides of the Airport, where the adjacent land is most densely populated and developed may be key considerations. Similar consideration should be taken for development to the east of the Airport, as future Airport projects may impact homes being planned in the future.

Human Trafficking

Although not directly related to socioeconomic impacts; environmental justice; or children's environmental health and safety risks; it's important to mention the global issue of human trafficking and its impact to the human environment. The United Nations defines human trafficking as "the acquisition of people by improper means such as force, fraud, or deception, with the aim of exploiting them." In other words, human trafficking is modern-day slavery. According to the International Labor Organization, an estimated 27 million people are currently being held as modern-day slaves, netting approximately $150 billion in profits each year for traffickers.

The travel industry, specifically airports and airlines, are in a unique position where they lie in the crossroads of the victim's journey. Airport and airline employees, given appropriate training, can play an important role in detecting and stopping human trafficking. Numerous aviation related organizations such as the Airline Ambassadors International and Air Transport Association provide free online training and resources. The Airport's participation in such training would be a vital asset to the international effort to eradicate human trafficking.

Visual Effects

The FAA Order 1050.1f Desk Reference states "visual effects deal broadly with the extent to which the proposed action or alternative(s) would either: 1) produce light emissions that create annoyance or interfere with activities; or 2) contrast with, or detract from, the visual resources and/or the visual character of the existing environment." Visual effects are therefore often broken into two categories: Light Emission Effects and Visual Resources and Visual Character.

Light Emissions

Light emissions are any light emanating from its source into the surrounding environment. Examples of sources of light emissions at COS include airfield and apron flood lighting, navigational aids, terminal lighting, parking facility lighting, roadway lighting, safety lighting on launch pads, additional lighting to support nighttime commercial space launches, and light generated from such launches. Glare is a type of light emission that occurs when light is reflected off a surface (e.g., window glass, solar panels, or reflective building surfaces).[8]

The light emitted from the Airport is needed and/or required to maintain aircraft and personal safety. The Airport is largely surrounded by developed areas such as roadways, manufacturing and office space, and military facilities. These are not typically light sensitive resources. As development occurs, light emission impacts to neighboring and planned residential development should be considered.

Visual Resources and Visual Character

Visual resources include buildings, sites, traditional cultural properties, and other natural or manmade landscape features that are visually important or have unique characteristics. *Visual character* refers to the overall visual makeup of the existing environment. For example, areas in close proximity to densely populated areas generally have a visual character that could be defined as urban, whereas less developed areas could have a visual character defined by the surrounding landscape features, such as open grass fields, forests, mountains, or deserts, etc.[9]

The Airport is located in the southeast corner of the City and is largely buffered from the surrounding communities by Peterson SFB to the north, general aviation hangars and industrial development to the west, and the Peak Innovation Park to the south of the terminal area. The area to the east is a planned development area with some development already occurring. An open space is located to the south of the north/south runways.

When planning future development projects at the Airport, considerations should be made to reduce or mitigate, to the extent possible, light emissions or development that would alter or impact the visual character of the area.

Noise and Compatible Land Use

"Noise" is considered unwanted sound that can disturb routine activities (e.g., sleep, conversation, student learning) and can cause annoyance. Aviation noise primarily results from the operation aircraft, such as departures, arrivals, overflights, taxiing, and engine run-ups.[10] Within the context of an Airport Master Plan, actions and development that may change runway configurations, airport

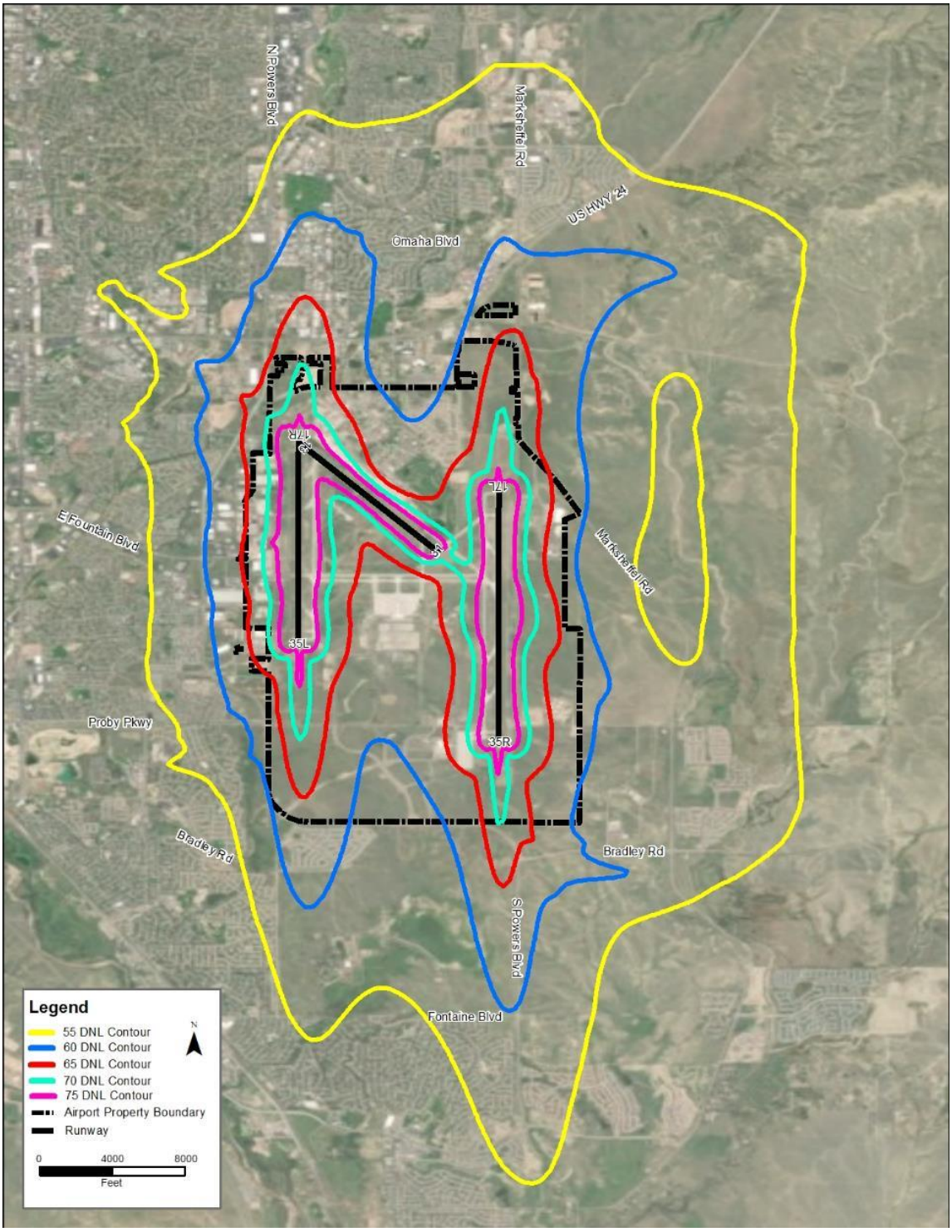
[8] FAA, Order 1050.1F Desk Reference, 2015
[9] FAA, Order 1050.1f Desk Reference, 2015
[10] FAA, Order 1050.1f Desk Reference, 2015

operational patterns, aircraft fleet mix, flight patterns, among others may have the potential to alter noise impacts on local communities.

A Land Use Compatibility Study was completed for the Airport in October 2020 that included the development of existing and future noise exposure contours and recommended an Airport Land Use Compatibility Plan. The Study also analyzed aircraft operations with noise readings conducted at different locations around the Airport. The updated day-night average sound level (DNL) noise contours were based on the Airport's annual service volume (ASV) or capacity. This differs from contours commonly based on an operations forecast. Basing the contours on the Airport's ASV accommodates the change in aircraft engine technology that equates to quiet aircraft, while at the same time protecting airspace for the full build out of the Airport as depicted in the ALP. **Figure 2-34** shows the contours based on ASV.

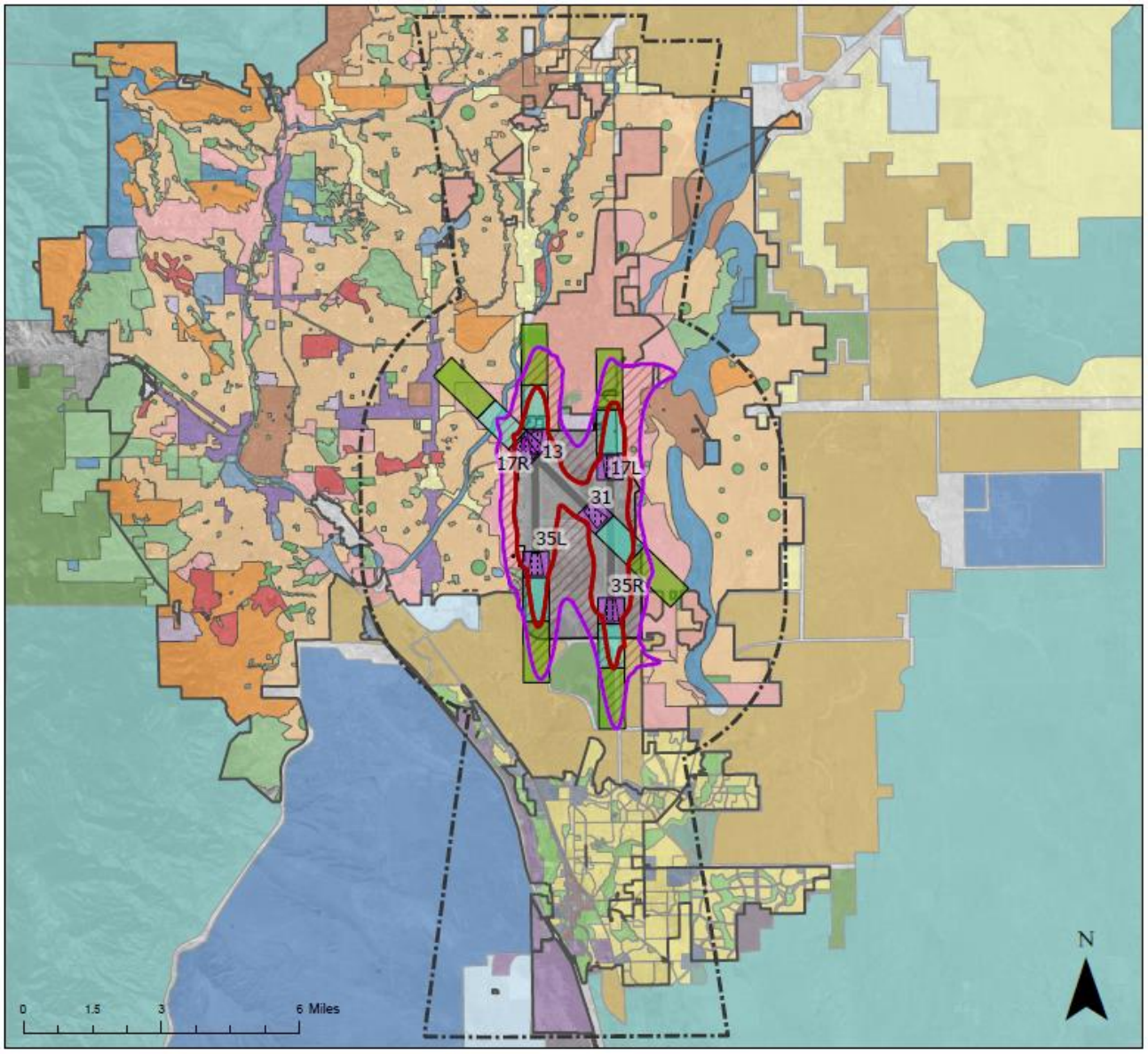
The Recommended Airport Land Use Compatibility Plan provides requirements for development within the vicinity of the Airport. The Plan took into account industry standards, developed guidance, and requirements to ensure compatible land use in the vicinity of COS as well as an appropriate review process. As a result of the analysis completed in the Plan, the limits of the Airport Overlay (AO) were modified, and the Aircraft Navigation Subzone (ANAV) was discontinued. **Figure 2-35** shows the modified overlay and subzones. Future development should consider the recommendations outlined in the Land Use Compatibility Plan as well as the limits of the modified overlay and subzones.

Figure 2-34: ASV DNL Contours



Source: KB Environmental Sciences, Inc.

Figure 2-35: Overlay and Subzone



Source: Jviation, a Woolpert Company

Water Resources

Water resources include wetlands, floodplains, surface waters, ground waters, and Wild and Scenic Rivers. These resources function together as a holistic system and are vital parts of the environment. Impacts to one resource can disrupt the entire system. Water resources provide drinking water and support recreation, transportation and commerce, industry, agriculture, and aquatic ecosystems. Water resources near COS are summarized in the following subsections.

Wetlands

Wetlands, as defined by the Clean Water Act (which regulates the discharge of pollutants into waters of the U.S.), are areas inundated or saturated by surface or ground water at a frequency and duration to support vegetation adapted to these conditions. Wetlands provide many benefits to the human, biological, and hydrological environment, including habitat for fish and wildlife, water quality improvement, floodwater storage, and recreational opportunities.[11] Federal, state, and local agencies are required to minimize the destruction, loss, or degradation of wetlands.

According to the U.S. Fish and Wildlife's National Wetland Inventory, limited wetlands and other waters of the U.S. exist on Airport property, with a riverine and freshwater pond located just south of E. Platte Avenue near Peterson SFB and north of the Airport. The same riverine channel extends just off Airport property near the WWII Aviation Museum on the west side of the Airport. Other small drainage channels intersect the airport property to the south. **Figure 2-36** illustrates known wetlands and waters of the U.S. in the vicinity of the Airport.

Although limited water resources are present on Airport property, future development should consider impacts to stormwater runoff and drainage areas that may feed into larger water systems and wetland areas.

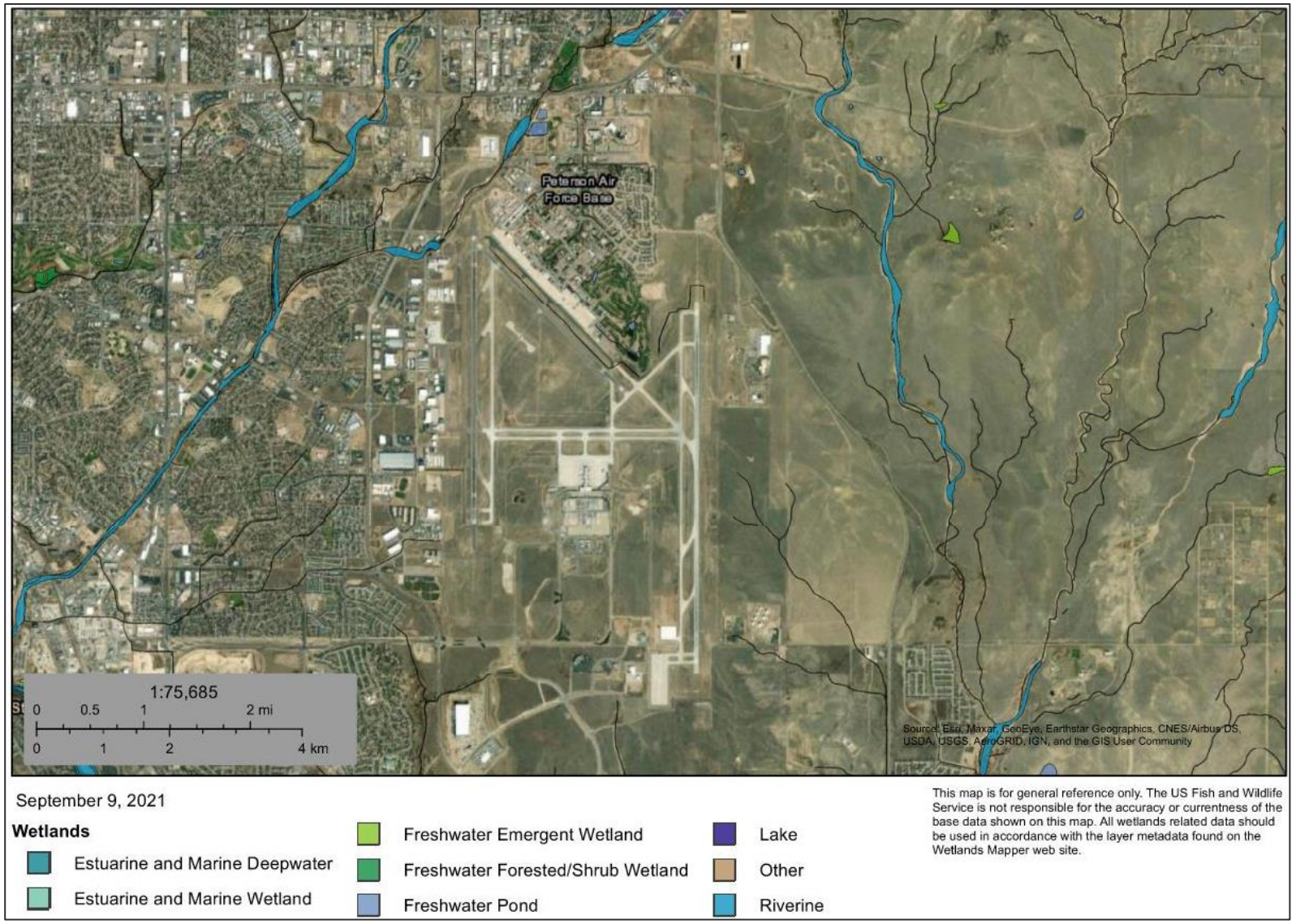
Floodplains

As stated in FAA Order 1050.1f, *Desk Reference*, floodplains are lowland areas adjoining inland and coastal waters which are periodically inundated by flood waters. Floodplains are often discussed in terms of the 100-year flood (or base flood). The 100-year flood is a flood having a 1 percent chance of occurring in any given year. Floodplains are valuable as they provide natural flood and erosion control, enhancement of biological productivity, and socioeconomic benefits and functions.

Floodplains are limited on Airport property and only exist on a stretch of the East Fork Sand Creek, a dry creek bed located just north of the approach ends to Runway 13 and Runway 17R.

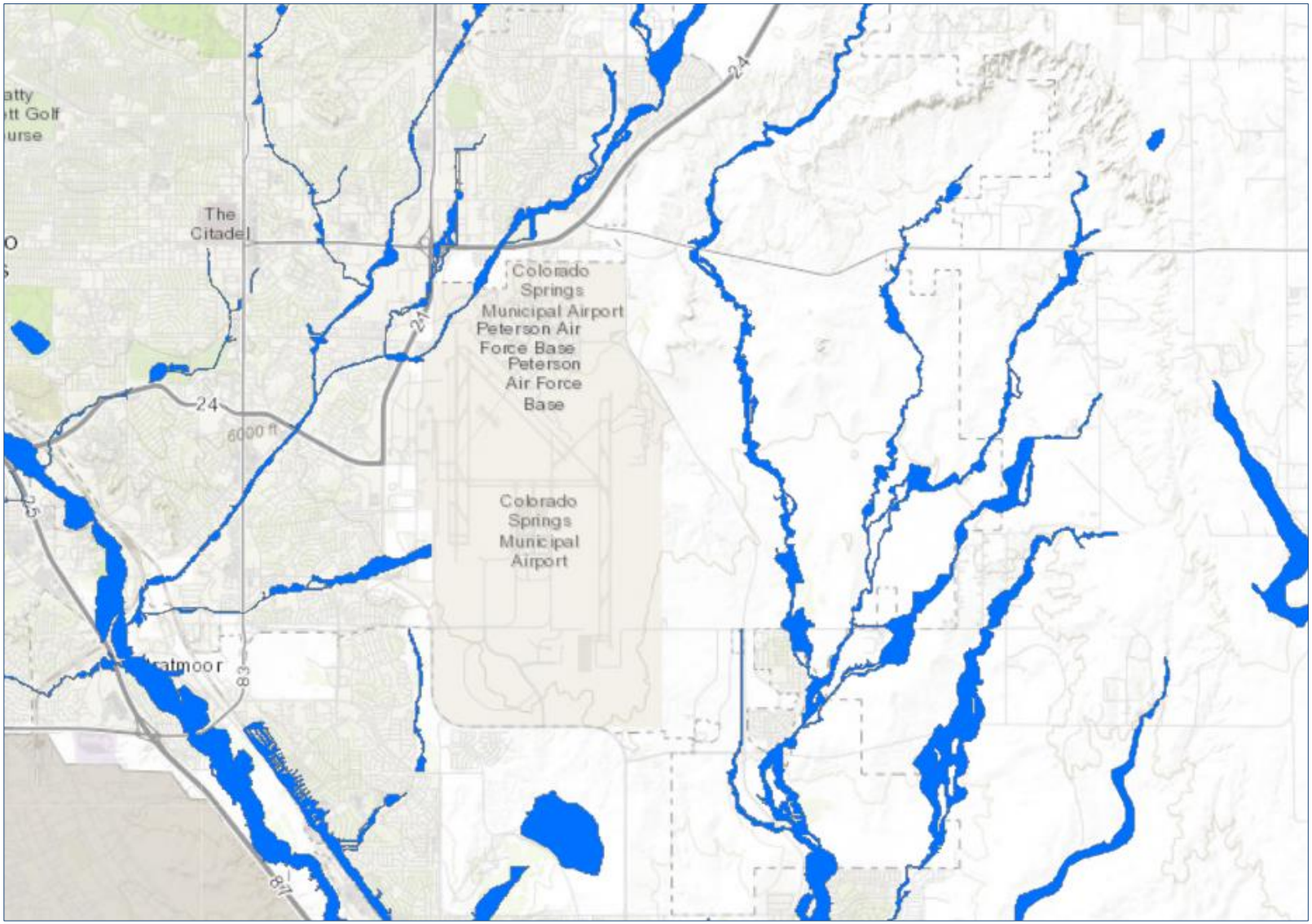
[11] FAA, Order 1050.1F Desk Reference 2015

Figure 2-36: National Wetlands Inventory Map


Peterson Air Force Base
1:75,685
0 0.5 1 2 mi
0 1 2 4 km
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
September 9, 2021
Wetlands
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake
Other
Riverine
This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Source: USFWS

Figure 2-37: 100-Year Floodplain



Source: City of Colorado Springs ArcGIS Map, 2021

Surface and Ground Waters

Surface waters include streams, rivers, lakes, ponds, estuaries, and oceans, while groundwaters include subsurface waters such as aquifers. As discussed above, surface water features are limited on and near the Airport. The East Fork Sand Creek is located to the west of the Airport and the Big Johnson Reservoir is to the south.

The Airport is located in the Fountain Creek Watershed, which extends more than 900 square miles in southern Colorado. Sporadic and widely distributed precipitation in this region has resulted in flooding and sediment deposition in Fountain Creek and its tributaries, resulting in a degraded watershed. The Airport is located near the Denver Basin Aquifer; this aquifer is comprised of four smaller aquifers: the Dawson, Denver, Arapahoe and Laramie-Fox Hills. The Denver Basin Aquifer is used primarily for municipal, domestic, commercial, and agricultural uses.

According to the City of Colorado Springs Stormwater Enterprise, nearly 80 percent of the area's water comes from the Western Slope of the Rocky Mountains, nearly 200 miles from Colorado Springs.

The primary surface water features in proximity to the Airport are the Big Johnson Reservoir, Fountain Creek, Jimmy Camp Creek, Sand Creek, and Windmill Gulch. Runoff from the Airport generally flows off-site via natural and constructed means. The western half of the Airport generally slopes to the southwest and discharges to the Sand Creek or Windmill Gulch; both of which discharge to Fountain Creek. The eastern half of the Airport slopes to the southeast and discharges to Jimmy Camp Creek (ultimately Fountain Creek. The southern portion of the Airport slopes to the south and discharges to the Big Johnson Reservoir. It is noted in the SPCC plan that Fountain Creek, Big Johnson Reservoir, and Jimmy Camp Creek are considered the highest priority water-ways to be protected in the event of a discharge.

Wild and Scenic Rivers

Wild and Scenic Rivers are those rivers having remarkable scenic, recreational, geologic, fish, wildlife, historic, or cultural value, as defined by the Wild and Scenic Rivers Act.

The U.S. National Park Service maintains a database of all rivers and river segments that are currently listed as wild and scenic or have been afforded the status of a "eligible or suitable" and may be eligible in the future for inclusion on the list. This list was updated in April 2021 and does not include any of the streams or tributaries that receive drainage from the Airport. Thus, there are no water resources within the Airport vicinity designated as "wild or scenic." The nearest wild and scenic river to the Airport is the Rio Grande River located over 100 miles to the south.

The Appendices of this report provide additional discussion of water resiliency to include both water quality and quantity and how the Airport can improve the local water quality and reduce consumption.

Summary

Information from the environmental categories data described above were reviewed, compiled, and have been summarized below in **Table 2-22**.

Table 2-22: Environmental Category Summary

Environmental Category	Summary
Air Quality	In maintenance for carbon monoxide, in attainment for other pollutants.
Biological Resources	No critical habitats present at the Airport, some species may be present on Airport property.
Climate	Operational and construction related emissions may contribute to GHG's.
Department of Transportation Act, Section 4(f)	Numerous public parks and the Bluestem Prairie Open Space are located in proximity to the Airport. Historic resources are also present on Peterson SFB.
Farmlands	Limited amount of prime farmland is present but is already developed and is unlikely to be farmland due to lack of irrigation.
Hazardous Materials, Solid Waste, and Pollution Prevention	Storage tanks for hazardous materials are located on the Airport, as well as usage for ARFF and deicing practices. A former landfill is also present near Runway 35L.
Historical, Architectural, Archeological, and Cultural Resources	A Historic District is located on Peterson SFB with four buildings included on the NRHP.
Natural Resources and Energy Supply	The Airport uses energy typical of its size and anticipates a similar level of consumption in the future.
Noise and Noise-Compatible Land Use	Land Use Compatibility Study to include updated noise contours was completed in 2020. Residential areas exist to the west, north, and south.
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks	Community demographics should be reviewed prior to projects with potential impacts to ensure negative socioeconomic impacts are mitigated.
Light Emissions, Visual Resources, and Visual Character	The Airport uses lighting systems, although with minimal impact to the community. Lights are located away from residential communities and are screened by buildings in most instances.
Wetlands	Limited presence to the north and west, primarily located just off Airport property.
Floodplain	Limited presence to the north as part of the East Fork Sand Creek.
Surface and Ground Waters	Three surface water features are included as part of the Peterson SFB Golf Course.
Wild and Scenic Rivers	The nearest wild and scenic river to the Airport is the Rio Grande River located over 100 miles to the south.

Source: Jviation, a Woolpert Company

3. Aviation Activity Forecast

Background

This chapter is a revision to the forecast chapter originally developed in the first half of 2020 as part of the Colorado Springs Airport (COS or Airport) Land Use Compatibility Study. Since the land use forecast is less than two years old, it had been intended to be directly incorporated into this follow-on Airport Master Plan Update. However, the advent of the pandemic at the time of land use study publication as well as its potential implications on aviation industry and COS operations necessitated an update. The following revision addresses the coronavirus pandemic (COVID-19) and recovery as it applies to the aviation activity at COS. It also incorporates Southwest Airlines, a new commercial air service provider within the market area that initiated service in 2021. Pertinent demographic and socioeconomic information have been also updated. Comparisons to the newly released Federal Aviation Administration (FAA) Terminal Area Forecast (TAF) are also presented. Note that since this chapter is a revision to the original forecast published in 2020 as part of the land use study, only those sections containing relevant and time-sensitive data and information have been updated.

Introduction

Forecasts of aviation activity at COS are generated to support key elements of the Airport Master Plan, such as facility requirements and future capital project identification. For these elements, projections are required for aircraft operational patterns that occur at the Airport, aircraft fleet mix, enplanements, cargo, and aircraft operations over a 20-year period. Specifically, projections of aviation demand from 2021 through 2041 were formally prepared in this study for commercial service and general aviation aircraft operations, passenger enplanements, air cargo, based aircraft, and aircraft fleet mix. These projections were created through updates to the 2019 through 2039 projections originally generated presented in the Colorado Springs Airport Land Use Compatibility Study.

This forecast chapter includes methodologies that consider aviation trends being experienced at the Airport and throughout the nation. Local historical data were collected from the FAA TAF and Airport records. In addition, demographic and socioeconomic data for the Colorado Springs Metropolitan Statistical Area (MSA) and the Airport's market area were used to track local trends and conditions that have the potential to impact demand levels. The base year for these forecasts is 2021, while the projections of aviation activity for the Airport were prepared for the near-term (2026), mid-term (2031), and long-term (2041) timeframes.

It should also be noted that while forecasting considers the most accurate information currently available, it is not an exact science. Divergences from a prepared forecast can often occur due to any number of factors that simply cannot be anticipated. However, when soundly established, a forecast will provide a reasonable and defensible rationale for a projection of future airport activity. The projections of aviation demand are documented in the following sections:

- Overview of the Airport Market Area
- Commercial Aviation Industry Trends
- General Aviation Industry Trends
- Historical and Current COS Aviation Activity
- Forecast Methodologies
- Projections of Passenger Enplanements
- Projections of Cargo Volume
- Projections of Aircraft Operations
- Based Aircraft Projections
- Peaking Characteristics
- Critical Aircraft Determination
- Summary

Finally, it is important to recognize that these preferred forecasts for COS are considered to be "unconstrained," meaning that it is assumed that any and all facilities necessary to accommodate the forecasted growth could and will be constructed, regardless of potential constraints to development or other possible limiting factors.

Overview of the Airport Market Area

There is often a strong correlation between an area's demographic and economic factors and its resultant demand for aviation activities. This section defines the COS market area and the various factors that have the potential to drive its current and projected need for aviation services.

Airport Market Area Defined

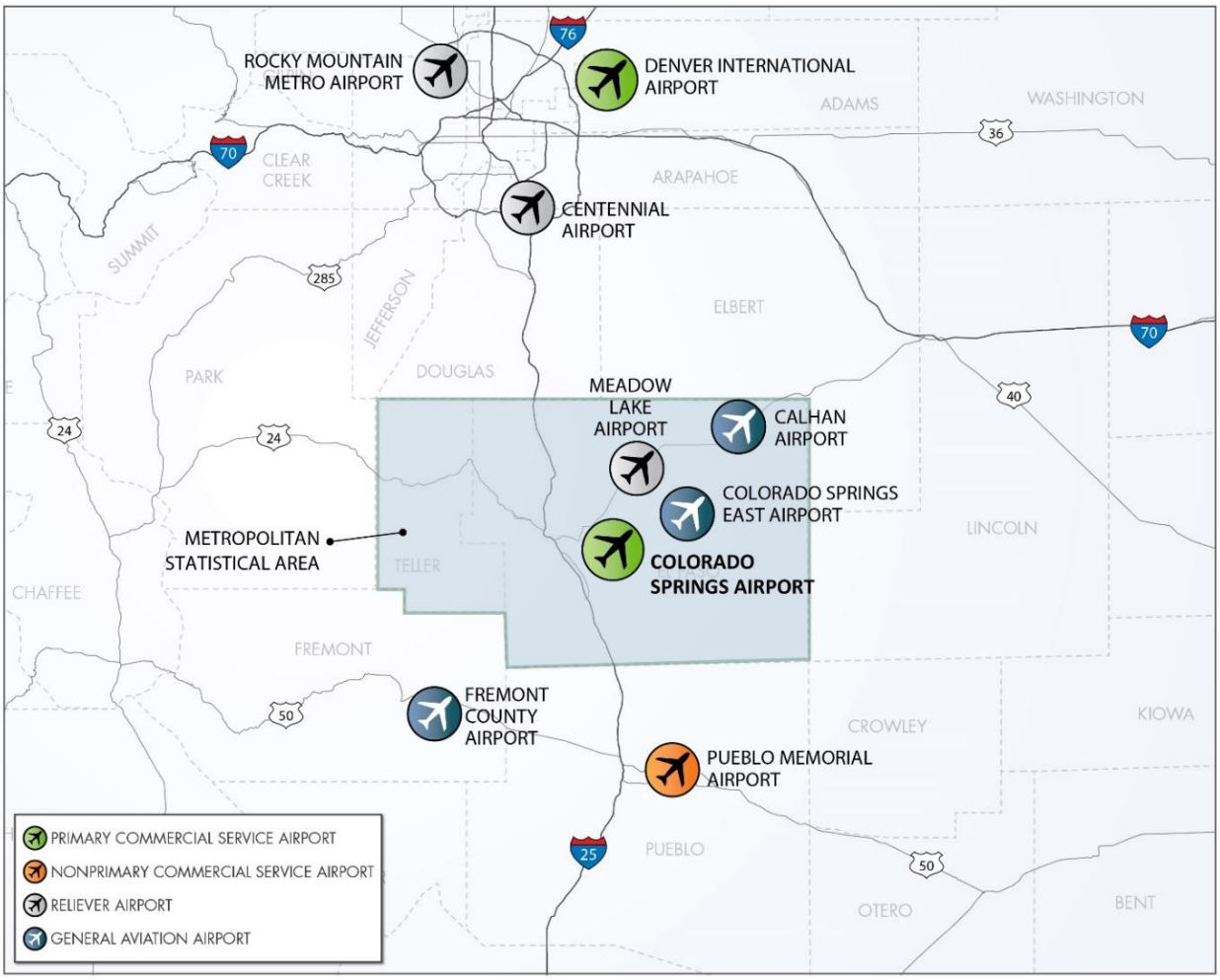
An airport's market area represents the geographic region from which a significant portion of aviation and commercial passenger demand originates. For COS, it can reasonably be assumed that most of the aviation-related demand originates within a two-county region (El Paso and Teller Counties) known as the Colorado Springs Metropolitan Statistical Area (MSA). This is particularly relevant for commercial airline passenger operations since proximity can be a primary consideration in passengers selecting an airport from which to travel, and COS is projected to remain as the MSA's only commercial service airport throughout the planning period.

Counties surrounding the Colorado Springs MSA comprise the secondary market area for COS (notably including Pueblo County which could be considered part of the primary market area by other definitions). Commercial airline passengers that originate from these extended areas are less proximate to COS and may be more inclined to also consider other factors in choosing a particular commercial service airport such as specific flight characteristics, availability, cost, and convenience, among others. For example, at only 86 miles from Colorado Springs, Denver International Airport is the Rocky Mountain region's largest and most active commercial air service airport and frequently attracts passengers from the northern counties of the secondary COS market area (e.g., Lincoln, Elbert, Douglas, Jefferson, and Park counties) and beyond. Pueblo Memorial Airport lies south of COS and may draw passengers from southern counties of the COS secondary market area including Crowley, Pueblo, and Fremont counties. It is important to remember that the exact market area that COS serves can change depending on the level of service and airfares offered at COS and the area's competing airports.

There are several other general aviation airports located within and surrounding COS's primary and secondary market areas that accommodate the region's general aviation demand. Although these airports do impact the COS market area with respect to general aviation, it is assumed that the existing general aviation usage pattern within the region will remain generally consistent. For COS, an exception to this may be in its increased utilization by corporate/business aircraft operators as regional economic development continues to evolve and grow.

Figure 3-1 illustrates the Colorado Springs MSA, surrounding counties and area airports.

Figure 3-1: Colorado Springs Airport Market Area



Source: Jviation, a Woolpert Company

Socioeconomic Trends Introduction

The demand for air transportation at COS is largely driven by a combination of the trends currently being realized within the airline industry and the socioeconomic conditions within the market area. This section summarizes those recent trends and projections in the COS market area with respect to population, employment, and income.

Population

According to the latest population data prepared by the Colorado Department of Local Affairs (DOLA), the population of the COS market area in 2021 totaled 765,423 residents (**Table 3-1**) with El Paso County accounting for over 96 percent of the total market area population. Teller County had a total population of 25,544 in 2021 and has grown at 0.81 percent annual rate over the past 20 years. The COS market area accounted for 13 percent of Colorado's total 2021 population, a percentage that is expected to increase over the next 20 years. The population of the COS market area has increased at an average annual growth rate of 1.6 percent since 2001, outpacing that of the state as a whole (1.4 percent). However, as the overall population of the COS market area continues to climb, its growth rate is projected to decline slightly to 1.3 percent over the next 20 years. These factors result in a COS market area population of approximately 989,617 residents by 2041.

Table 3-1: Historical and Projected Market Area Employment

	Teller County	El Paso County	COS Market Area	Colorado	Market Area % of Colorado
Historical					
2001	21,738	536,336	558,074	4,444,513	12.6%
2011	23,339	638,640	661,979	5,124,143	12.9%
2021	25,544	739,880	765,423	5,865,418	13.0%
Average Annual Growth Rate					
2001 - 2011	0.7%	1.8%	1.7%	1.4%	-
2011 - 2021	0.9%	1.5%	1.5%	1.4%	-
2001 - 2021	0.8%	1.6%	1.6%	1.4%	-
Projected					
2026	26,812	788,066	814,877	6,204,443	13.1%
2031	27,587	847,708	875,295	6,627,760	13.2%
2041	28,787	960,829	989,617	7,380,748	13.4%
Average Annual Growth Rate					
2021 - 2026	1.0%	1.3%	1.3%	1.1%	-
2026 - 2031	0.8%	1.4%	1.4%	1.2%	-
2031 - 2041	0.4%	1.3%	1.2%	1.1%	-
2021 - 2041	0.6%	1.3%	1.3%	1.2%	-

Source: Colorado Department of Local Affairs, 2021

Employment

Table 3-2 presents historical and projected employment data for the COS market area. According to data provided by DOLA, estimated employment (total jobs) in the COS market area in 2011 was 340,007 and grew to 398,069 jobs in 2021. This represents an average annual growth rate of 1.6 percent, which is significantly higher than any year since 2001. Overall employment in the COS market area is projected to reach 496,322 jobs by 2040, growing at an average annual growth rate of 1.2 percent. (Data were not available beyond 2040.)

Table 3-2: Historical and Projected Market Area Employment

	Employment
Historical	
2001	321,226
2011	340,007
2021	398,069
Average Annual Growth Rate	
2001 - 2011	0.6%
2011 - 2021	1.6%
2001 - 2021	1.1%
Projection	
2026	434,578
2031	462,432
2040	496,322
Average Annual Growth Rate	
2021 - 2026	3.0%
2026 - 2031	1.3%
2031 - 2040	0.8%
2021 - 2040	1.2%

Source: Colorado Department of Local Affairs, 2021

Based on the U.S. Bureau of Labor Statistics, the latest reported (June 2021) unemployment rate in the COS market area was 6.5 percent, slightly higher than that of Colorado at 6.2 percent and the U.S. at 5.9 percent. An increase of jobs in the service and educational sectors as well as the health care sector have been the primary contributors to the market area's overall employment growth. Prior to the pandemic, the COS market area unemployment rate typically fell between that of Colorado's on the higher side and the U.S. on the lower side. In February 2020, the month prior to the start of the pandemic, the unemployment rate was 3.0 percent for Colorado Springs MSA and 4.5 percent for Colorado as a whole. To provide additional context for the area's economy, the largest employers in the market area are provided in **Table 3-3.**

Table 3-3: Market Area Major Employers/Non DOD

Private Employers	Industry	Public Employers	Industry
The Broadmoor Hotel	Hospitality	Charter Spectrum West	Back Office/Customer Service
California Casualty Group	Back Office/Customer Service	City of Colorado Springs	City Government
CaptionCall LLC	Back Office/Customer Service	Colorado Springs Utilities	Power/Water/Wastewater/Gas
Cherwell Software	Information Technology	Discover Goodwill	Other Office
Cheyenne Mountain, Dolce Resort	Hospitality	El Paso County	County Government
Children's Hospital of Colorado	Health Care	Fort Carson	Military Installation
Cobham Semiconductor Solutions	Manufacturing	Lockheed Martin Corp.	Aerospace/Aviation
Colorado College	Higher Education	Microchip Technology	Information Technology
Compassion International	Nonprofit	Peterson Space Force Base	Military Installation
EviCore	Back Office/Customer Service	Pikes Peak Community College	Higher Education
Firstsource Solutions, Ltd.	Back Office/Customer Service	Progressive Insurance Company	Insurance
Focus on the Family	Nonprofit	School District #2	Public Education
Luce Research	Back Office/Customer Service	School District #3	Public Education
Parsons	Information Technology	School District #8	Public Education
Peak Vista Community Health	Healthcare	School District #11	Public Education
Penrose-St. Francis/Centura	Healthcare	School District #20	Public Education
UCHealth – Memorial Health	Healthcare	School District #49	Public Education
United Service Automobile Assoc.	Financial/Insurance Serv.	Schriever Air Force Base	Military Installation
Western Forge Corporation	Manufacturing	United States Air Force Academy	Higher Education/Military

Source: Colorado Springs Chamber & EDC, 2019

Income

Income is a socioeconomic indicator that often correlates directly with aviation forecasts. Broadly speaking, historical personal income data for the COS market area showed strong positive growth prior to the pandemic in 2020. From 2000 to 2015 personal income for the area increased at an average annual growth rate of 5.8 percent. However, after consultation with the State of Colorado, it was understood that personal income projections have been currently removed from state analyses and subsequent forecasting considerations due to what is assumed to be the outlier years of 2020 and 2021. Pandemic-related considerations include increased job loss and governmental income supplementation, neither of which are expected to continue and are unlikely to represent income dispersion in future years. Thus, income factors have not been included in this forecasting effort due to recent volatility and the inability to draw appropriate conclusions in such conditions.

Business Climate

The COS market area offers many competitive advantages for area businesses including excellent transportation systems, communication networks, utility infrastructure, and an attractive lifestyle. Impressive growth in the market area is being experienced within a variety of business sectors. One important reason that companies are choosing to locate and/or grow offices in the region is that the City

of Colorado Springs has consistently ranked at or near the top of the list for most desirable places to live in the U.S. by various media outlets. Another factor in the region's attractiveness for business growth is the proactive and aggressive approaches taken by the region's various economic development advocates and agencies, as well as the business-friendly policies advocated by its local governments.

COS is positioned to not only be a critical asset in attracting businesses to the region, but it also plays a key role in business and economic development. As home to the Peak Innovation Park, a 900-acre master planned business park that accommodates office, industrial, entertainment, recreation, and hospitality businesses and activities, COS is directly promoting regional economic growth by offering development opportunities that have the potential to be directly or indirectly integrated with Airport operations. One example of the growth and expansion of the Airport and region is a partnership between COS and the U.S. Forest Service in building a $17 million regional firefighting base that will allow air tankers to load retardant to fight forest fires within a 15-state region. Additionally, in December 2019, President Trump signed a law that would establish Space Force, a 6th independent military service branch to undertake missions and operations in the rapidly evolving space domain. Peterson Space Force Base (PSFB), which shares COS airfield facilities, may be one of several locations to accommodate Space Force operations. Lastly, Amazon's development of a 3.7-million square foot fulfillment center is another example of a commercial project that is already spurring additional development in the Park.

Tourism

For many tourists, COS serves as a convenient means to access the Rocky Mountain region for hiking, skiing, and other outdoor activities provided by the region's many well-known resort towns. According to Visit Colorado Springs, the region welcomed over 23 million visitors in 2019, generating more than $6.6 million a day for local economies, 7.0 percent more than 2017. Similarly, hotel demand in Colorado Springs in 2019 grew 2.6 percent faster than in 2018, representing continued signs of rapid growth.

State and Local Incentives

The Colorado Springs MSA offers a wide variety of local and state tax incentives, tax credits, and employee training programs designed to incentivize business development and promote regional economic growth. Several of these initiatives have been codified in the tax codes of the state and local taxing authorities, including tax exclusions for manufacturing equipment, inventory stock, and others. There are also multiple aviation-related incentive programs that are highlighted below:

- **Aviation Development Zone Tax Credit** – This is a statewide, calendar year performance-based job creation incentive. The Colorado Springs Airport is a recognized Aviation Development Zone (ADZ) through the Colorado Office of Economic Development and International Trade. A business or any portion of

a business that is involved in aircraft manufacturing or maintenance and repair, completion or modification of aircraft located within the boundaries of an ADZ may qualify for a state income tax credit of $1,200 per net new full-time employee.

- **Colorado Sales and Use Tax Exemption on Aircraft and Aircraft Parts** – Aircraft used in interstate commerce by a commercial airline and parts permanently affixed to aircraft are exempt from state sales and use tax.

- **Commercial Aeronautical Zone** – The Airport is located within a regionally created Commercial Aeronautical Zone (CAZ), which recognizes significant tax incentives for aeronautical businesses. All local sales and use taxes are abated for companies located within the CAZ and specifically engaged in a variety of aeronautical activities.

- **Pikes Peak Enterprise Zone** – This program is designed to promote job creation, business growth, and development opportunities in areas targeted for economic stimulation. The Airport is located within the Pikes Peak Enterprise Zone and nearby businesses may be eligible for one or several of the Colorado Business Income Tax Credits related to hiring new employees, making investments in equipment, training employees, or conducting research and development activities.

- **Federal Opportunity Zone** – This program is a federal tax incentive to invest in low-income urban and rural communities through the favorable treatment of reinvested capital gains and forgiveness of tax on new capital gains. COS is located within this zone.

- **Colorado Springs Foreign Trade Zone** – A Foreign Trade Zone is a restricted access area located within the United States and Puerto Rico that is considered legally outside the customs territory of the United States. The key benefits in a Foreign Trade Zone are duty deferral, duty reduction and duty avoidance for the transfer, use, and storage of imported materials. Import duties are deferred until the materials physically leave the Foreign Trade Zone or reduced if used in a product with a lower duty rate. There is no import duty if the materials, or products in which imported materials are used, are re-exported. COS is located within the Colorado Springs Foreign Trade Zone.

Commercial Aviation Industry Trends

In preparing a forecast of activity for COS, it is important to have an appreciation of recent and anticipated national aviation industry trends that have the potential to impact the development of aviation activity projections. These trends, including the COVID-19 pandemic and recovery, will have varying degrees of relevance for COS, so it is likely that some trends discussed below may ultimately have limited or no pronounced impact on the Airport.

Commercial Aviation History and Current Conditions

Prior to the passing of the Airline Deregulation Act of 1978, the airline industry was controlled by the Civil Aeronautics Board (CAB), an agency of the U.S. federal government. CAB regulated airline routes, fares, and the entry of new airlines into the market. Since deregulation and the inception of a free market, there have been five distinct business cycles in the U.S. airline industry:

- **Expansion and Consolidation (1978 – 2000):** Legacy airlines expanded service and there were many new entrants to the market like America West Airlines and ValuJet Airlines. Eventually, many of the new entrants failed or were acquired by larger, legacy carriers during the mid-1990s. Airline consolidation, or the merger of two airlines, continued into the 2000s. Carriers consolidated in the 1980s to build regional hubs. Consolidation in the 1990s was more focused on buying assets like international route authorities. Consolidation in the 2000s was largely necessary for airlines to survive financially.

- **Status Quo (2001 – 2006):** During the early 2000s, the airline industry was significantly impacted by the events of 9/11, its aftermath, and the beginning of a rise in fuel prices. The average cost of a barrel of oil from 1978 to 2004 was less than $50.0F[1] Oil prices peaked at $165 per barrel in 2008. This was critical since jet fuel is the second largest cost center after labor for an airline. This rapid increase in oil cost made the majority of commercial airline service unprofitable and unsustainable. There was little relationship between growth in U.S. gross domestic product (GDP) and the number of available airline seats (seat capacity). Historically, there had been a high and positive correlation between GDP and airline service.

- **Rationalization (2007 – 2009):** The Great Recession and the "new normal" of higher fuel prices sent macroeconomic shocks into the airline industry. In response, airlines underwent an active reduction in available seat capacity. The industry also moved its focus from mainline operations to the use of regional operators or "feeders" that used smaller aircraft. This trend further reduced the number of available seats. As the supply of available seats decreased, the remaining seats became more valuable because of the scarcity, and fares subsequently rose. This resulted in increased revenues per seat for the airlines.

- **Capacity Discipline (2010 – 2014):** During this period, seat capacity growth continued to be restricted by network carriers, including Southwest Airlines (a "Low-Cost Carrier"), even as increased passenger enplanements persisted. A growing demand for seats, as demonstrated by increased enplanements, coupled with restricted supply in available seats, led to even higher airline revenues per available seat.

[1] "Crude Oil Prices – 70 Year Historical Chart," Macrotrends.net, accessed March 25, 2020, https://www.macrotrends.net/1369/crude-oil-price-history-chart.

- **Capacity Regeneration (2015 – present):** The seat capacity discipline exhibited by airlines prior to 2015 began to give way to new, measured seat growth that more closely mirrored growth in the U.S. economy. Seat growth since 2015 has been the result of a general trend toward larger aircraft, in addition to added service. Air carriers continue to trend toward replacing smaller 50-seat regional jets with larger aircraft that can seat at least 70 to 90 passengers.[2]

In 2000, eleven mainline carriers were operating in the United States. Today, after seven major airline consolidations, only five mainline carriers remain (Delta Air Lines, United Airlines, Southwest Airlines, American Airlines, and Alaska Airlines). Together with low-cost carriers jetBlue, Spirit Airlines, Frontier Airlines, Allegiant Air, and Sun Country Airlines, these carriers provide the vast majority of U.S. scheduled domestic service.

Over the last two decades, airlines also began to shift their business model from maximizing market share to maximizing earnings. They accomplished this as they exercised more growth discipline. Specifically, the industry has worked to correlate its overall capacity growth (as reflected in Available Seat Miles [ASM]) with growth in the U.S. economy (in the form of real gross domestic product [GDP]). During the 1991 – 2001 period, ASMs had grown by 100 percent as compared to the base period, whereas real GDP had grown by 66 percent. The fact that ASMs were growing much faster than the growth in the economy made it difficult for airlines to price the seats and earn a sufficient profit. As a result, when available seats were significantly higher than growth in the economy, the U.S. airline industry lost billions of dollars. As rates of seat growth have become more aligned with GDP growth, airlines have become more profitable.

Airline and airport/community interests have diverged as the industry has evolved and matured. Early airline strategies were to grow market share. To do so, airlines aggressively added seats to the system. In the era immediately following deregulation, airlines sought out cities where they could concentrate service to increase their market share in a “city-pair” (origin city and destination city). The result of this market-focused model meant business development in local communities followed available air service, which acted as a utility to the community.

Under the profit-focused business model more prevalent today, airlines seek out a strong, established local economy that can support air service and therefore maximize the airlines’ revenue. Airports still want growth, while airlines are much less aggressive in adding seats as they focus on profits.

Community-driven goals of airports are to attract air service that business and leisure passengers in a community demand. In addition, air service brings passengers who spend money on hotels, meals, rental cars, and other items that

[2] Federal Aviation Administration, *Report to Congress: National Plan of Integrated Airport Systems (NPIAS) 2019-2023*, www.faa.gov, September 26, 2018, p. 33, https://www.faa.gov/airports/planning_capacity/npias/reports/media/NPIAS-Report-2019-2023-Narrative.pdf.

have an economic impact on that community. With the existence of competition for air service in virtually every region of the U.S., communities must be assertive in their air service development strategies or risk losing service to another market.

According to the FAA, U.S. passenger carriers posted their 11th consecutive year of profits in 2019, with ancillary revenues a contributing factor to the favorable outcome. During 2019, domestic enplanements increased 4.1 percent, totaling 813 million. As a result, the domestic average load factor reached 85.1 percent, a new historic high, and domestic yields increased for the second time since 2014. All network and low-cost carriers reported strong profits in 2019, as they raised prices and created ever more efficient operational structures. Relatively low fuel prices also contributed to US airline profitability.

The recent world-wide grounding of Boeing 737 Max aircraft has had an impact on operations for carriers that are heavily reliant on Boeing. While most customers have been re-accommodated on alternate aircraft, airlines have had to cancel thousands of flights and delay growth plans. The aircraft was authorized to return to service in November 2020.

In addition to commercial passenger service, COS accommodates cargo freight and express services. FedEx is one of the Airport's largest and most active cargo operators, with multiple 757 aircraft operations daily. On a national level, domestic and international air cargo revenue ton miles have increased 2.2 percent annually from 2010 to 2018. All-cargo carriers, those that carry cargo exclusively, carry 42 percent domestically while the greater share goes international.

COVID-19 Pandemic Industry Impacts and Recovery

In 2020 and 2021, COVID-19 negatively impacted the aviation industry as well as the world economy more than any other previous crisis. During the height of the pandemic, non-essential travel was significantly reduced resulting in airlines making deep capacity cuts, grounding fleets, and initiating massive layoffs. Aircraft production came to a halt. According to Airports Council International-North America (ACI-NA), it is estimated passenger activity declined 73 percent from March 2020 through June and total enplanements in the U.S. decreased by 349 million passengers for the year[3]. For a period, general aviation activity and aircraft orders slowed drastically, but recovered relatively quickly as general aviation aircraft afforded users the ability to travel while avoiding commercial service aircraft. Additionally, after a near shutdown of three months, flight training operations rapidly improved as those with interest took advantage of being house-bound by taking flight lessons. Essential missions throughout the military continued during the pandemic. Local training, however, was reduced as evidenced by the 25 percent reduction in military local operations at COS.

In 2021, the impact to the aviation industry of COVID-19 has lessened considerably, especially in the United States. Aviation recovery, notably of

[3] https://airportscouncil.org/wp-content/uploads/2020/03/Economic-Impact-of-Coronavirus-on-U.S.-Commercial-Airports.pdf

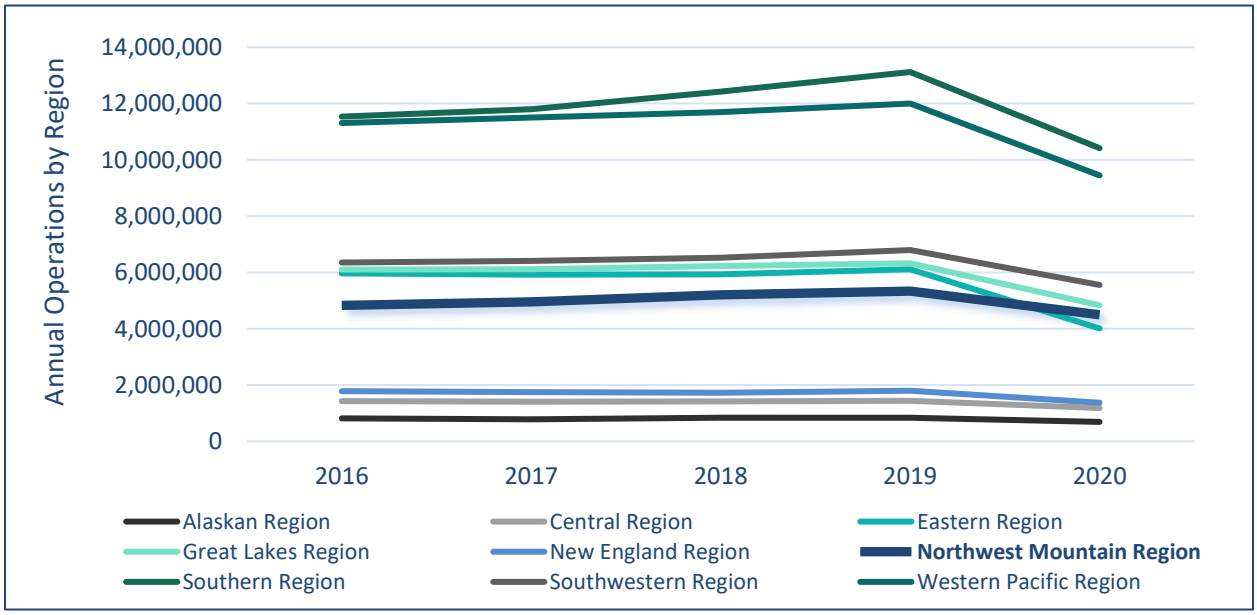
commercial passenger service, is progressing in earnest, although multiple hurdles still exist for the final stages of recovery. The major airlines have begun hiring, and new service and routes have been instigated across the country, including the new Southwest service at COS.

While the long-term implications of the pandemic on the aviation industry are still unknown, the impacts are trending towards lessened significance. Terminal design, passenger handling, and other items are still being discussed and researched and best practices will be developed for implementation in the future. The resilience of the aviation industry, with support from the U.S. government, has been demonstrated throughout history. The following sections show some of the recovery of the aviation industry and presents data pertinent to activity at COS, the region, and the country.

Regional Perspective

The FAA divides the United States into eight regions, with COS residing in the Northwest Mountain Region (Colorado, Wyoming, Utah, Montana, Idaho, Washington, and Oregon). The total operations (take-off or landing) by region over the past five years are shown below in **Figure 3-2**; note that every region reflects a sharp drop in operations from 2019 to 2020 due to the pandemic. However, it should also be recognized that the Northwest Mountain Region experienced the smallest percentage decrease in year-over-year operations with 2020 operations equaling 84 percent of those experienced in 2019. Other regions across the country ranged between 66 to 82 percent. A reasonable conclusion to draw from this difference is that since the pandemic impacted aviation activity in the Northwest Mountain Region less severely compared to the rest of the country, less recovery is required to return to previous levels.

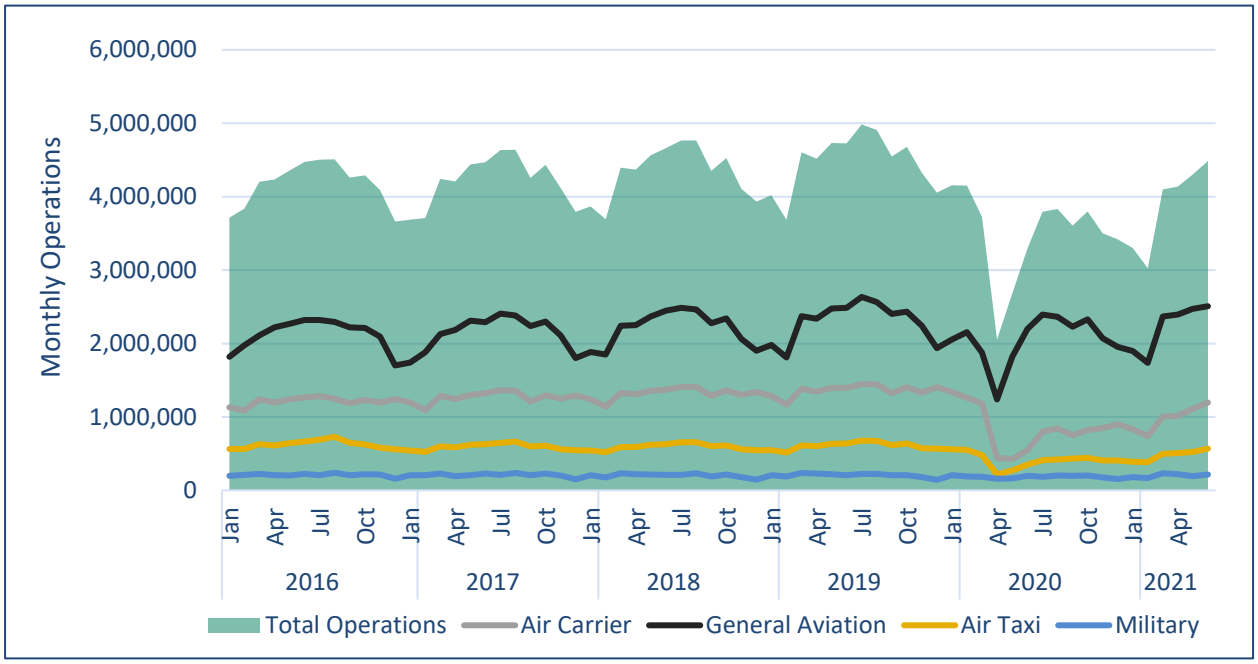
Figure 3-2: Operations by Region



Source: FAA ATADS, OpsNet

A deeper dive into the Northwest Mountain Region operations sheds some light on how the various types of flight activity (air carrier, general aviation, air taxi, and military) were impacted and have rebounded to varying degrees (**Figure 3-3**). The seasonality of flight activity is clearly seen, with steep drops in activity typically experienced during the winter months.

Figure 3-3: Aircraft Operational Breakdown - Northwest Mountain Region



Source: FAA ATADS

With respect to the pandemic, March/April 2020 saw dramatic declines in operations across all operational categories. Data indicate that while general aviation was greatly affected during the first four months of the pandemic, the degree to which that impact has continued is limited. After quickly rebounding during summer 2020, the general aviation recovery leveled off to approximately 90 percent of 2019 activity levels. The steady growth that had been experienced in the region since 2016 until the 2020 pandemic has begun to reappear with 2021 totals exceeding 2016 levels. This trend is expected to continue.

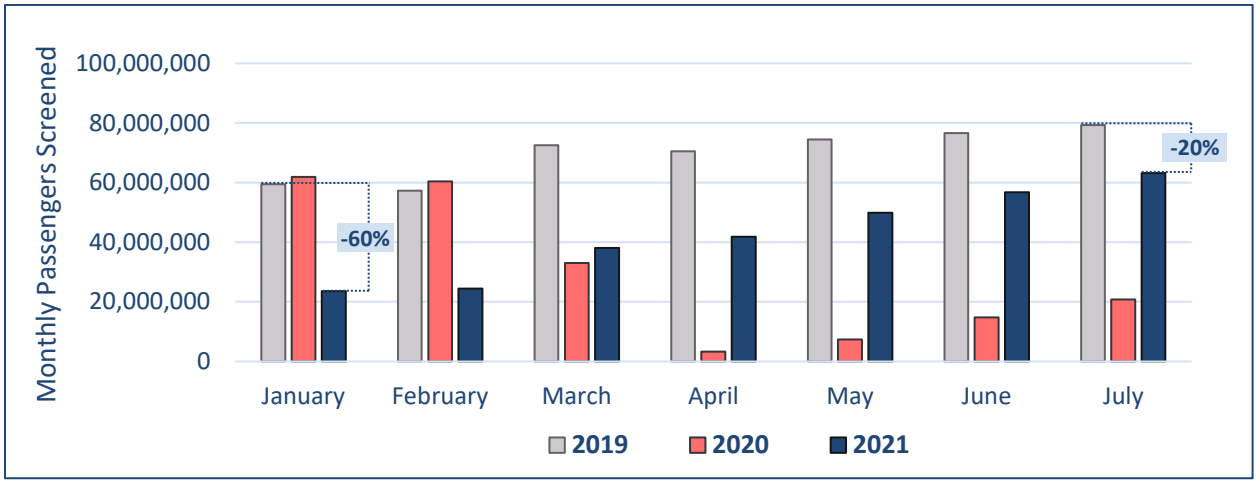
Air carrier and air taxi service saw a quick rebound in the initial months as well, although not to the same degree as general aviation. In June 2021, the total operations in the region equaled 95 percent of the operations in June 2019. Of those, there were 1,197,835 air carrier operations recorded, equaling 86 percent of the air carrier operations in June 2019.

National to Local Perspective

Commercial service recovery and citizens' willingness to fly can be measured through the number of passengers screened by TSA (**Figure 3-4**). Graphed below are the number of passengers screened by TSA over the entire country, split by month and compared side-by-side by year (2019, 2020, and 2021). For the first

month of the year in 2021, TSA screened 60 percent fewer passengers as compared to 2019. By July, TSA screened only 20 percent fewer passengers as compared to 2019. This data substantiates the air carrier operations activity levels, which were shown to have significantly recovered but not yet to the 2019 levels.

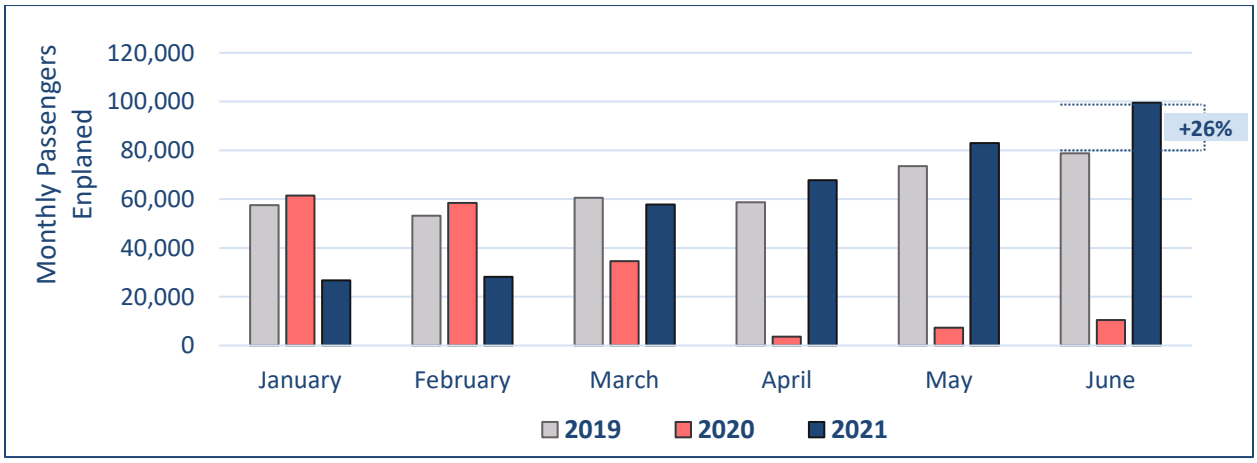
Figure 3-4: TSA Passengers Screened



Source: TSA

The number of passengers at COS has recovered more quickly than the national levels demonstrated by TSA screening. For COS, the number of enplanements (a passenger boarding a plane) in 2020 dropped to 43 percent of the 2019 enplanements. However, a month-to-month comparison shows the Airport's commercial service has quickly recovered and with the addition of Southwest Airlines, the Airport is on track to finish 2021 with enplanements only slightly below (projected at 91 percent) of its 2019 pre-pandemic enplanements (**Figure 3-5**). In fact, the airport enplaned more passengers in June 2021 than in any other month in at least the previous five years and the month-to-month comparison was up 26 percent over 2019.

Figure 3-5: COS Passengers Enplaned



Source: COS

It is evident that the nation's aviation activity continues to rebound, although still trailing the high marks set by 2019. The Northwest Mountain Region has weathered the storm better than most of the country and COS has been less impacted than many airports with local data strongly indicating the airport's recovery and growth. Taken together, these metrics should provide confidence in continued airport usage for all activity types, as well as a return to continued growth.

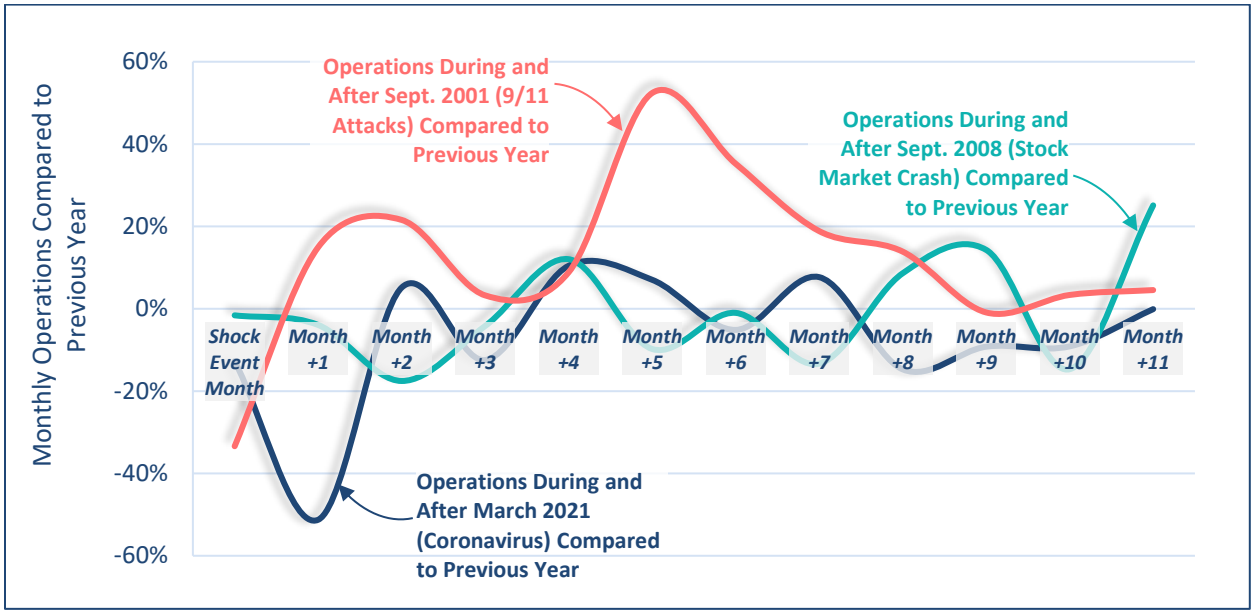
Historical Indicators

As the aviation industry continues to recover from the pandemic, history provides some examples of similar shock events that can serve as benchmarks to help anticipate the aviation industry's expected recovery. Two previous major aviation shock events experienced in the last 20 years were the terrorist attacks of September 11, 2001 (9/11) and the "Great Recession" from 2007 through 2009, with a major stock market crash occurring on September 28, 2008.

Following 9/11, commercial airline travel declined significantly as people stopped flying for fear of safety, while during and after the Great Recession, flying slowed more so due to economics. The pandemic appears to have resulted in a combination of both: fear for personal health and high levels of unemployment and uncertainty in the job market. In these previous two events, aspects of the aviation industry recovered at different speeds with commercial airline service tending to be most impacted and slowest to recover.

Figure 3-6 below presents the change in all operations (take offs and landings for general aviation and commercial service combined) at COS for the 11 months after each of the three shock events as compared to the monthly operations of the previous year. Of these three events, the pandemic appears to have impacted air traffic the most with the largest drop occurring in April 2020 (down 51 percent at COS compared to April 2019). From March through June 2020, COS experienced approximately 82 percent of the operations seen during the same period one year prior. However, from July through December 2020, the Airport experienced 100 percent of the traffic levels as compared to the previous year. While every airport is impacted differently by these type of shock events, it is important to acknowledge that COS has operationally recovered relatively quickly from the pandemic.

Figure 3-6: Shock Events



Source: FAA ATADS

General Commercial Aviation Trends

The nation's domestic network carriers have been more disciplined since 2015 in their approach to managing growth, and carriers are increasingly revenue-driven. There are also other trends in the U.S. airline industry that have impacted air service at U.S. airports.

Pilot Shortage

In 2013, the FAA increased the qualification requirements for first officers (also known as co-pilots) who fly for U.S. passenger and cargo airlines. FAA now requires first officers to hold an Airline Transport Pilot certificate, requiring 1,500 hours total time as a pilot. Previously, first officers were required to have a commercial pilot certificate, which requires a minimum of 250 hours of flight time.

Prior to the pandemic, a U.S. Government Accountability Office (GAO) report indicated airlines in the U.S. will need to hire 1,900 to 4,500 new pilots annually to meet demand. In the past year, analyses by CAE and OliverWyman indicate the pilot shortage has been exacerbated by the pandemic. In fact, a report published by CAE stated a there will be a global need for 27,000 pilots in the short-term. The impact is felt at the regional airline level, due to a decline in qualified entry-level pilots. Entry-level pilots are needed to fill positions vacated by pilots hired by mainline carriers. There are also negative perceptions as they relate to salary and benefits for pilots who fly for regional airlines.

A lack of qualified pilots is a challenge for airlines to retain their service and attract new service. The decline in travelers as a result of the COVID-19 pandemic has temporarily alleviated the shortage; however, if passenger demand for air

travel returns and the number of qualified pilots continues to decrease, the weakest performing routes may be the first to lose air service, especially if an alternative airport is within a reasonable driving distance.

Fleet Evolution

There is a national airline trend that reflects a migration from using smaller (50-seat) aircraft to larger (70-90 seat) aircraft. This trend is especially impactful on nonhub airports since small regional jets have historically been used to serve the nation's smaller airports. This is important in that nonhub airports would now have to generate sufficient demand to support the larger aircraft to maintain airline service profitability, and not all smaller airports and markets would be able to do so. As an example, three daily flights of 50-seat aircraft would serve 150 daily passengers, whereas three daily flights by 90-seat aircraft would accommodate 270 passengers. A community may not have the passenger base to justify the same number of flights with larger aircraft. In this case, an airline using larger aircraft might prefer only two daily flights (180 passengers) of 90-seat aircraft. Thus, the trend toward using larger aircraft may threaten to reduce or eliminate existing and/or new air service at nonhub airports.

Airport Infrastructure and Connectivity Constraints

Airport infrastructure, particularly access to large and medium hub airports, is critical for nonhub airports to thrive. Passengers leaving nonhub airports most often fly to a larger airport to connect to another flight to reach their final destination. Some larger or busier airports lack available gates to absorb more flights, and consequently, this can result in constraining airlines wishing to expand services from those larger airports to smaller, nonhub airports.

The Rise of Hub Alternatives for Leisure Markets

Air service from most mainline carriers has evolved into a "hub-and-spoke" model which is one in that flights from smaller airports are routed through larger connecting hub airports where passengers make connections to another flight to their eventual destination. This differs from the point-to-point model often used by low cost carriers to provide flights to leisure-oriented destinations. While hub operations are used to improve airline operating efficiencies, point-to-point operations tend to improve opportunities for destination markets.

"Open Skies" Agreements

Open Skies Agreements (OSAs) minimize governmental regulation on air transport between two countries. Such agreements can enhance international travel by lifting restrictions on the destinations that foreign airlines can access and removing barriers such as regulations and tariffs. OSAs encourage competition, allowing airlines to expand to new markets and lower the cost of doing business.

The Volatility of Oil Prices

Price unpredictability has made it difficult for airlines to maintain consistent profitability since airlines cannot guarantee the cost to provide service. The price of oil is highly susceptible to geopolitical and macroeconomic shocks. Even low oil prices are not always a good thing for airlines, as low oil prices can signal weakness in the global economy. A weakening global economy causes airlines to reduce service from their respective hubs, diminishing connectivity levels at nonhub airports that are largely reliant on having the largest number of connecting options possible.

The U.S. Economy, Global Trade Tensions, and Wall Street

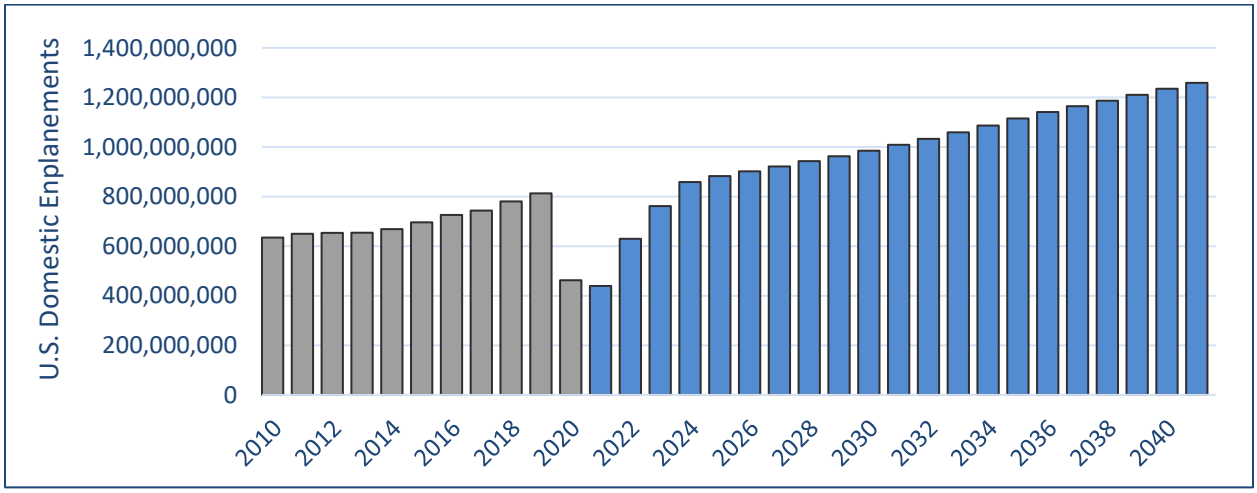
The airline industry is susceptible to economic disruptions occurring on the national and world stage. Sluggish macroeconomic indicators (such as GDP, unemployment rate, etc.), pandemics, international trade disputes, and little appetite from Wall Street investors for growth in airline service have put additional performance pressure on the airline industry. These effects trickle down to the smallest markets, and many small and nonhub airports must competitively provide air service incentives as a cost of entry for new service.

Summary of National Commercial Aviation Trends

The FAA develops forecasts of future levels of commercial passenger activity based on a combination of past commercial airline trends and national/world economic outlooks. The most recent forecasts of commercial passenger activity available is the *FAA Aerospace Forecasts, Fiscal Years 2021-2041*, which presents both near-term and long-term forecasts. Specifically, the FAA forecasts commercial passenger activity to decrease 5.0 percent from 2020 through 2021 and then grow annually an average of 8.7 percent from 2021 through 2031. This reflects the anticipated upward trend in domestic passenger traffic following the pandemic.

Additionally, the FAA projects domestic air carrier load factors to increase from a low of 68.7 percent in 2020 to 86.1 percent by 2031 and to 86.6 percent by 2041. The FAA also projects that total domestic passenger enplanements on large U.S. carriers and regional/commuter carriers combined will increase from approximately 439 million in 2020 to approximately 1.26 billion in 2041, representing an average annual growth rate of approximately 5.4 percent. The steep recovery in the short-term impacts the average annual growth rate over the entire 20-year period. For comparison, prior to the pandemic drop, the forecast average annual growth rate was 1.6 percent. This was from 2019 (816 million enplanements) to 2039 (1.12 billion). Historic and projected U.S. total domestic passenger enplanement data is depicted below in **Figure 3-7.**

Figure 3-7: Total U.S. Enplanements 2010-2041



Source: FAA Aerospace Forecasts, *Fiscal Years 2021-2041*
Note: Historical years are in gray

For 2020 to 2041, the FAA also forecasts that for domestic U.S. mainline carriers the average passenger trip length is expected to increase from 1,016 to 1,063 miles and average seats per aircraft mile will increase from 167 to 177 seats, indicating more efficient and profitable operations. Over that same period, the FAA projects regional/commuter carriers' average domestic passenger trip length to slightly increase from 502 to 508 miles. The number of seats per aircraft is also growing in the regional jet market, where it is expected that 50-seat regional jets will continue to be phased out of the market and replaced by 70-90 seat regional jet aircraft. This fleet mix transition will result to the average seats per aircraft mile increasing from 65 to 69 and the average domestic load factor increasing from 67 to 81 percent. Regional/commuter aircraft operations are expected to increase at an average annual rate of 1.1 percent through 2041.

Finally, the FAA projects that the international air cargo industry will experience significant growth within the forecast period. Between 2020 and 2041, international all-cargo carriers are expected to experience 3.8 percent average annual growth in revenue-ton miles. Although positive, domestic air cargo that is transported on dedicated cargo aircraft and in passenger aircraft is expected to grow at a much more modest rate of 1.6 percent annually over that same period.

General Aviation Industry Trends

General Aviation Defined

At the national level, fluctuating trends related to general aviation usage and economic uncertainty resulting from national and international business cycles will have impacts on demand levels. This section provides an overview of those current general aviation trends, as well as some of the various factors that have influenced those trends throughout the U.S. These are important considerations in the development of projections of aviation demand for COS since general aviation accounts for a significant percentage of airport activity.

General aviation aircraft are classified as all aircraft not flown by commercial airlines or the military. This includes an incredibly diverse array of flying that can range from a personal trip in a small single engine aircraft to an emergency medical evacuation to business-related travel to flight instruction that trains new pilots to helicopter traffic reports that keep drivers informed of rush-hour delays. Simply stated, general aviation encapsulates all those individual, unscheduled aviation activities that enrich, enhance, preserve, and protect the lives of citizens.

As defined by the FAA, general aviation activities are divided into six use categories:

- **Personal** – About a third of all private flying in the United States is for personal reasons, which may include practicing flying skills, personal or family travel, personal enjoyment, or personal business.
- **Instructional** – This category includes all private flight instruction and training ranging from private pilot to airline pilot.
- **Corporate** - About 12 percent of the total private flying in the U.S. is done in aircraft owned by a business and piloted by a professional pilot. Most of these flights are in turbine/jet aircraft and cover long distances, with some flying to intercontinental and international destinations. Businesses typically elect to fly these trips to save time and expand their geographic markets.
- **Business** – It is estimated that almost 11 percent of the total private flying in the U.S. is done by businesspersons flying themselves to meetings or other events, primarily in piston or turboprop aircraft. Most of the pilots own or work for relatively small businesses and use the aircraft to accomplish missions that would otherwise take more time or would be infeasible.
- **Air Charter** – When scheduled air service either is not available or inconvenient, businesses and individuals can charter aircraft from air charter providers. These flights save time and make it possible to fly directly to places that cannot be reached by scheduled passenger service airlines. These operators use general aviation facilities and are not considered air taxi operators, which are a commercial activity and discussed in more detail later in this chapter.
- **Other** – All other general aviation activities are classified as being "other." Given its diverse nature, this includes aircraft performing a broad range of functions related to, but not limited to, disaster relief, search and rescue, police operations, news reporting, border patrol, forest fire fighting, aerial photography and surveying, crop dusting, and tourism activities.

Business Use of General Aviation

Business and corporate aviation are the fastest growing facets of general aviation, contributing over $128 billion to U.S. economic output annually and employing more than one million people. The difference between the business and corporate aviation is that corporate aircraft are flown by professional pilots carrying passengers for hire, whereas business aircraft are flown by pilots flying

the aircraft on company business. Companies and individuals use aircraft as a tool to improve the efficiency and productivity of their business and personnel. Use of general aircraft afford businesses and individuals direct control of their travel itineraries, destinations and significantly reduce travel times and inconveniences often associated with scheduled airline service.

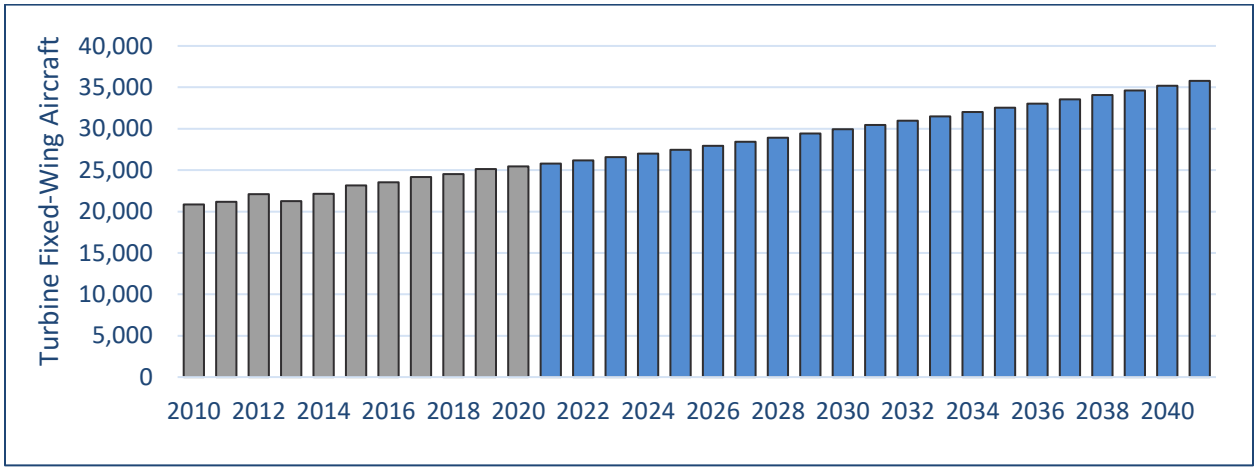
It is important to note that corporate general aviation is not the exclusive concern of Fortune 500 companies. In fact, according to the National Business Aviation Association's (NBAA) Business Aviation Fact Book 2019, only three percent of the approximately 15,000 business aircraft registered in the U.S. are flown by these companies. The remaining 97 percent are operated by a broad cross-section of organizations, including government, universities, charitable organizations, and businesses of all sizes.

In terms of the growth and development of business aviation, Honeywell's 28th Annual Business Aviation Outlook, 2019 highlighted the following:

- Up to 7,700 deliveries of new business jets valued at over $251 billion are expected through 2028
- Operators plan to replace 20 percent of their fleets with new jets within the next 5 years
- Large cabin jets account for more than 62 percent of new purchases
- 61 percent of worldwide sales originate in North America

Use of general aviation aircraft by business and corporate operators ranges from small, single-engine aircraft rentals to multiple aircraft corporate fleets supported by dedicated flight crews and mechanics. Business aircraft usage by smaller companies has also escalated dramatically as various chartering, leasing, fractional ownership, interchange agreements, partnerships, and management contracts have emerged. The growth in this facet of the industry is reflected in **Figure 3-8** below that presents the FAA's historical and projected number of general aviation turbine aircraft.

Figure 3-8: Active General Aviation Turbine Aircraft 2010-2041



Source: FAA Aerospace Forecast 2021-2041
Note: Historical years are in gray

Of special note with respect to corporate and business aviation is the immense popularity of fractional ownership operations. Since their inception in 1986, fractional ownership programs offered business aircraft users increased flexibility in the ownership and operation of aircraft, as well as providing a financially viable alternative to flying commercially. Such programs use alternative aircraft acquisition concepts over traditional methods, including shared or joint aircraft ownership, and provide for the management of the aircraft by an aircraft management company. The aircraft owners participating in such a program agree not only to share their aircraft with others having a common interest in that aircraft, but also to lease their aircraft to other owners in the program. The aircraft owners use a common management company to provide aviation management services including maintenance of the aircraft, pilots, scheduling and administration of the leasing of the aircraft among the owners. Even during times of unsteady economic conditions, fractional operator businesses have consistently grown as existing and new customers increase or initiate their fractional aircraft usage.

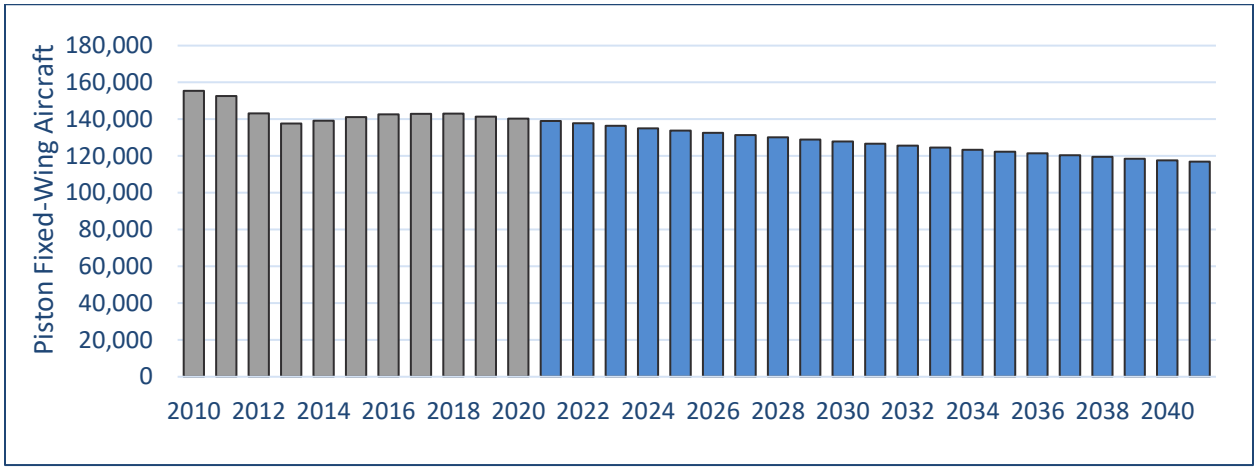
One of the most important trends identified by the FAA in their forecasts is the strong growth anticipated in active general aviation jet aircraft. In terms of growth in the number of turbine aircraft (i.e., turboprop and jet), 2013 saw the overall production of jet aircraft decline slightly due to the economic recession and the resultant pressures on companies to reduce costs. However, since that time, the production of jet aircraft has experienced substantial growth, increasing at over 2.0 percent annually on average from approximately 20,853 aircraft to 25,510 between 2010 and 2018. The active general aviation turboprop and jet aircraft fleet is anticipated to continue to increase by nearly 56 percent over the projection period to more than 35,000 aircraft by 2041.

General Aviation Piston Operators

Single and multi-engine piston aircraft experienced a decline in the number of aircraft between 2010 and 2020. Although still by far the largest portion of aircraft in the active general aviation fleet, the number of single engine aircraft fell from 139,519 in 2010 to an estimated 127,290 in 2020, a 0.9 percent average annual decline. During that same period, multi-engine piston aircraft experienced a steeper decline, falling from 15,900 aircraft to 12,395, a 2.5 percent annual decrease. In total, active piston fixed-wing aircraft decreased at 0.9 percent annually. Much of this decline is attributed to the retirement of older aircraft in combination with the relatively high costs of newer aircraft and increasing costs for fuel and maintenance services.

In its annual Aerospace Forecast, the FAA expects the number of active piston general aviation aircraft to continue to decline at a rate similar to that of the past 10 years. Specifically, the decrease in the number of piston aircraft is expected to average 0.9 percent per year over the next two decades. The resultant forecast shows total piston aircraft (combined single- and multi-engine) falling from 140,315 in 2020 to 116,905 in 2041. This is reflected in **Figure 3-9** below.

Figure 3-9: Active General Aviation Piston Aircraft 2010-2041



Source: FAA Aerospace Forecast 2021-2041
Note: Historical years are in gray

Other Forecasted Metrics

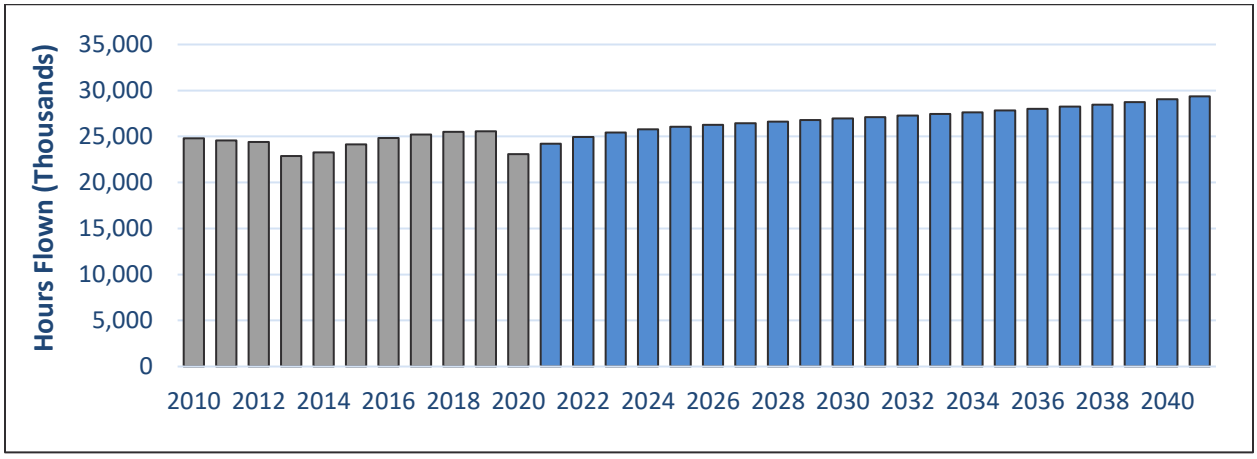
The FAA also tracks and projects an important metric known as Active General Aviation and Air Taxi Hours Flown, which captures several activity-related data including aircraft utilization, frequency of use, and duration of use. From 2010 to 2020, hours flown in general aviation piston aircraft experienced a slight decline (0.4 percent annual average) that is expected to continue at an increasing rate over the 20-year planning period (0.7 percent annual average). Conversely, turboprop and jet aircraft hours flown are expected to continue to grow at relatively high rate of 2.6 percent on average annually from 2021 to 2041.

Figure 3-10 below depicts historical general aviation and air taxi hours flown from 2010 through 2020 as well as projected hours flown through 2041. Total hours flown by general aviation and air-taxi aircraft are estimated to reach 29.4 million

by 2041, compared to an estimated 23.1 million in 2020. As shown in the graph, a decline was experienced from 2011 to 2013 spurred by the economic recession, much of which was realized by piston aircraft owners. However, since that time, hours flown totals have recovered and the FAA currently projects a steady increase of 1.0 percent on average through 2041. When comparing this to the FAA projected average annual growth rate of the general aviation active fleet (0.1 percent average annual growth rate), the difference represents an anticipated increase in aircraft utilization.

Light sport aircraft represents a relatively new category in FAA aircraft classifications. These small, lightweight aircraft are forecasted to see an increase of 4.0 percent a year in hours flown, primarily driven by growth in the fleet. Hours flown for experimental aircraft are also forecasted to increase, growing at an average annual rate of 1.4 percent over the next two decades.

Figure 3-10: U.S. General Aviation and Air Taxi Hours Flown 2010-2041



Source: FAA Aerospace Forecast 2021-2041
Note: Historical years are in gray

Summary of National General Aviation Trends

The following excerpt from the *FAA Aerospace Forecast 2021-2041* summarizes the overall general aviation market:

> *The long-term outlook for general aviation thus is more promising than before, as growth at the high-end offsets continuing retirements at the traditional low end of the sector. The active general aviation fleet is forecast to increase slightly by 0.1 percent between 2021 and 2041, after recording a decline of 2.8 percent in 2020 from the year before (active fleet shrinks 1 percent by 2041 from its 2019 level). Turbine aircraft, including rotorcraft is estimated to not experience a decline between 2019 and 2020, while the total of piston fleet is estimated to have decreased by 1.1 percent in 2020 from the previous year. While steady growth in both GDP and corporate profits results in continued growth of the turbine and rotorcraft fleets, the largest*

segment of the fleet – fixed wing piston aircraft will continue to shrink over the forecast period. Against the marginally declining active general aviation fleet between 2019 and 2041, the number of general aviation hours flown is projected to increase by a total of 14.8 percent from 2019 to 2041 (an average of 0.6 percent per year), as growth in turbine, rotorcraft, and experimental hours more than offset a decline in fixed wing piston hours.

Incentivized by time savings efficiencies and benefits, demand for business aviation is anticipated to far exceed that of private or recreational aviation, where the rising costs associated with aircraft operations and pilot proficiency have suppressed demand. This simply means that business aviation in the form of turboprops and jets will grow faster than that of piston aircraft, with an average annual growth forecast of 1.7 percent. That projected robust growth in turbine aircraft along with growth in light sport and experimental aircraft will offset the continuing decline of piston aircraft during the 20-year period. This will result in a slight overall increase of total general aviation aircraft of 0.1 percent on average per year through 2041.

Historical and Current COS Aviation Activity

Historical enplanement, cargo, operations, and based aircraft data for COS provide the baseline from which future activity at the Airport can be projected. While historical trends are not always reflective of future periods, historical data can provide insight into how local, regional, and national demographic and aviation-related trends may be tied to a given airport. The following sections include historical overviews of COS's enplaned passengers (passengers boarding commercial flights departing COS), cargo (landed weights), aircraft operations (generally defined as either an aircraft landing or departure; thus, a takeoff and a landing would count as two operations), and based aircraft (generally defined as an aircraft that is permanently stored at an airport).

As a commercial service airport, COS collects and maintains detailed enplanement records for carriers using the Airport. These records have been utilized for reviewing historical enplanement activity at the Airport. For purposes of forecasting and determining related facility requirements, it was assumed that deplanement activity (passengers arriving on flights to COS) is equivalent to enplaned passengers. This method of passenger forecasting is consistent with FAA guidance and common practices.

Similar to passenger activity, COS management regularly records air cargo activity based on the "landed weight" of cargo aircraft, which includes the weight of the aircraft as well as its fuel and cargo. "Cargo service" airports are classified as such by being served by aircraft providing air transportation of only cargo with a total annual landed weight of more than 100 million pounds, in addition to any other air transportation services that may be available at the airport. With over 100 million pounds of landed weight on a regular basis, COS is categorized by the FAA as a cargo service airport as well as a commercial service airport.

Since COS has a dedicated staff for operations, planning, and statistics, it has a formal mechanism for counting, recording, and storing airport operations data on a regular basis. That information is ultimately posted on the Airport website and provided to the FAA for storage in a centralized federal database for use by the FAA in the development of a Terminal Area Forecast (TAF) for the Airport. While Airport records are the primary source for historical activity, other sources can be utilized to establish and verify the historical activity records for COS including the following:

- FAA Terminal Area Forecast (TAF) data for COS (Issued May 2021)
- COS FAA 5010 Data (Effective date August 2021)
- FAA Air Traffic Activity Data System (ATADS)
- FAA Traffic Flow Management System Counts (TFMSC)

COS Commercial Airline Service Passenger Trends

In March 2021 Southwest Airlines (SWA) initiated new service for Colorado Springs with initial offerings being comprised of 13 daily non-stop flights to the focus cities of Chicago, Dallas, Denver, Las Vegas, and Phoenix. The addition of SWA has also been accompanied by increased enplanements from the existing air carriers at COS. Given the circumstances surrounding the pandemic, SWA has performed strongly with relatively robust enplanements and load factors on 143 passenger Boeing 737-700 and 175 passenger Boeing 737-800 aircraft.

Passenger activity at COS declined at an average annual rate of 5.5 percent between 2001 and 2020, much of which was experienced from 2019 to 2020 due to the pandemic. From 2001 to 2019, the annual average rate of decline was only 1.3 percent. More specifically, traffic at the airport declined from 2001 to 2015, and then began increasing in 2016. From January 2021 through June 2021, the airport experienced a significant increase, enplaning nearly the same number of passengers during that period as all of 2020 (see **Table 3-4**). It should also be recognized that prior to 2008, COS consistently enplaned over 1 million annual passengers, and since that time, the economic foundations of the region have grown significantly. This improving economic base continues to support and enhance the demand for commercial passenger service, as evidenced by the addition of SWA and its growing number of annual enplanements.

Table 3-4: COS Annual Enplanements 2001-2021

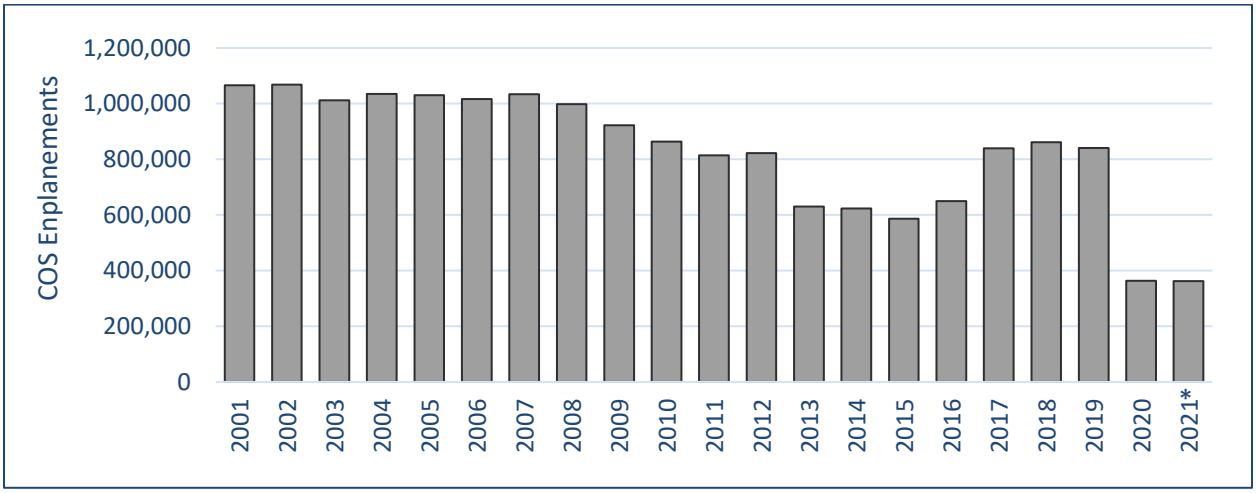
Year	Total Enplanements	Annual % Change
2001	1,065,854	-
2002	1,068,157	0.2%
2003	1,011,643	-5.3%
2004	1,034,747	2.3%
2005	1,030,833	-0.4%
2006	1,017,016	-1.3%
2007	1,033,586	1.6%
2008	998,347	-3.4%
2009	921,681	-7.7%
2010	863,407	-6.3%
2011	814,336	-5.7%
2012	822,008	0.9%
2013	629,711	-23.4%
2014	622,982	-1.1%
2015	586,783	-5.8%
2016	649,190	10.6%
2017	839,438	29.3%
2018	861,625	2.6%
2019	841,059	-2.4%
2020	363,843	-56.7%
2021 (Jan - June)	362,789	
Average Annual Growth Rates		
2001 – 2010	-2.3%	-
2016 – 2020	-13.5%	-
2001 – 2020	-5.5%	-

Source: Airport records

There have been several fluctuations in passenger activity at COS over the last 20 years spurred by the entrance and exit of Alaska Airlines and Allegiant Air, various levels of fluctuating service provided by Frontier Airlines, changes in the patterns and level of regional airline activity, industry wide changes, and multiple events within the national economy.

At its peak, COS was served by 10 different scheduled commercial air carriers. After eight years of consistent activity and limited growth from 2001 to 2008, airline mergers and consolidation led to an eight-year period of overall decline in enplanements. From 2008 to 2015, enplanements declined by over 40 percent and from 2019 to 2020 airport enplanements dropped by 57 percent (see **Figure 3-11**).

Figure 3-11: COS Historical Annual Enplanements 2001-2021



*2021 only includes data for January - June.
Source: Airport records

Additionally, when historical enplanements are analyzed by carrier, a shift in the carriers serving COS over the last 20 years can be recognized. The scheduled commercial passenger airlines serving COS and their annual enplanements are presented in **Table 3-5**.

From 2015 through 2019, COS experienced a recovery in its enplanements with the re-entrance of Frontier Airlines into the market in April 2016. By 2017, enplanements increased 29.3 percent over a similar period in 2016.

Today, the Airport is served by five different scheduled commercial air carriers: American, Delta, Frontier, Southwest, and United. Generally, small regional carriers have come and gone while large airlines have retained service. As a result, mainline carriers have absorbed much of the demand for passenger service in the region. Although American and United Airlines have long held dominant roles at COS (accounting for over 65 percent of enplanements in 2019), Southwest accounted for the most enplanements of any individual airline in 2021. Delta Air Lines has had declining enplanements throughout most of the past 20 years at COS.

Although airlines at COS have had wide and varied levels of enplanements, the expected growth in population and the strength of regional economic fundamentals throughout the market area should ultimately drive air carriers to increase their levels of passenger service.

Table 3-5: Total Annual Enplanements by Airline 2001-2021

Year	Alaska	Allegiant	American	America West	Continental Express	Delta	Express Jet	Frontier	Great Plains	Mesa	Midwest	Northwest	Southwest	US Airways	United	Vanguard	Charters	Total
2001			306,505	100,481	60,890	223,108			2,465	6,833		68,021			284,446	1,518	11,587	1,065,854
2002		18,152	275,207	97,701	71,957	198,886			13,052	5,085		66,214			283,933	26,635	11,335	1,068,157
2003		35,825	207,125	107,470	69,366	187,741			2,772	5,179		78,327			317,321		517	1,011,643
2004		37,440	173,322	107,428	69,767	222,155				4,643		86,261			332,448		1,283	1,034,747
2005		30,697	218,984	119,326	70,481	166,993				4,333		84,471			334,426		1,122	1,030,833
2006		35,224	234,930		79,723	139,485				2,886		77,794		94,078	351,779		1,117	1,017,016
2007		33,281	236,423		76,534	137,849	44,345				11,719	79,368		91,746	321,194		1,127	1,033,586
2008		33,543	213,341		71,763	105,057	48,050	62,316			4,793	72,884		82,577	302,857		1,166	998,347
2009		32,673	208,535		71,827	87,547		103,964				48,034		65,448	302,857		796	921,681
2010		38,258	190,462		70,194	127,924		110,371						517	325,112		569	863,407
2011		41,855	178,324			107,864		104,961							379,454		1,878	814,336
2012		38,834	177,505			96,392		154,743							352,371		2,163	822,008
2013	2,908	25,962	174,186			84,262									340,621		1,772	629,711
2014	21,121	29,771	180,342			82,410									306,916		2,422	622,982
2015	20,789	34,220	168,710			76,575									286,489			586,783
2016	21,953	29,221	167,565			77,488		66,516							286,447			649,190
2017	18,849	22,527	201,625			78,068		232,302							286,067			839,438
2018		3,796	240,036			72,253		259,946							285,594			861,625
2019			232,580			76,463		214,659							317,357			841,059
2020			141,892			35,796		68,954							117,203			363,845
2021 (Jan. – June)			88,269			18,366		44,671					111,561		99,922			362,789

Source: Airport records

Origin-Destination Passenger Base

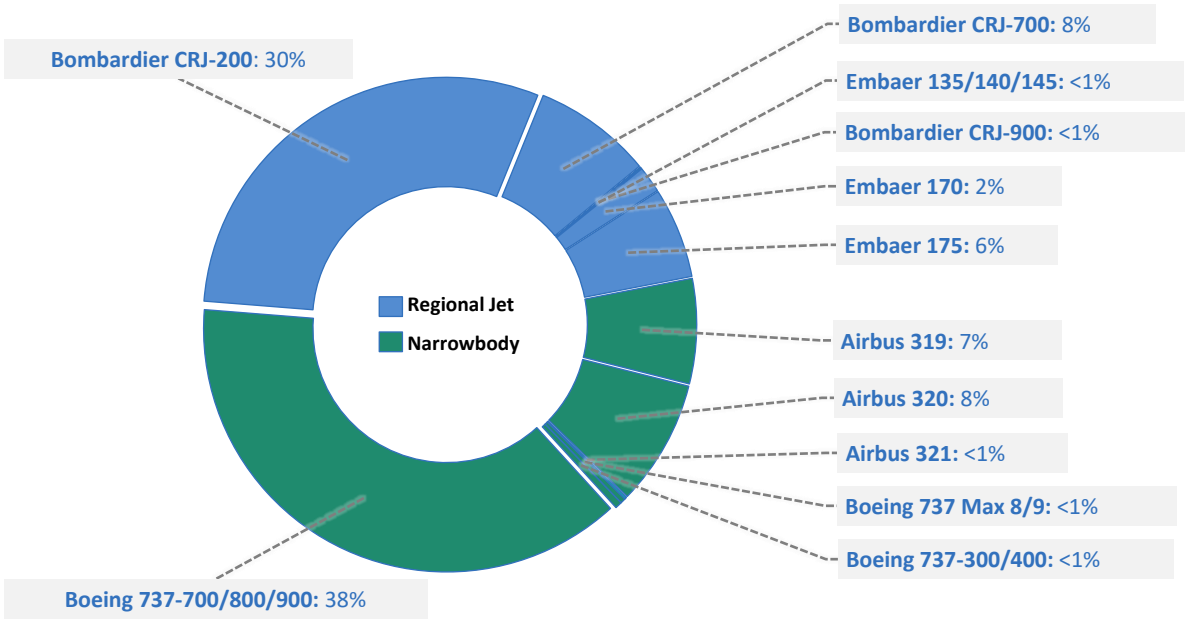
COS is primarily an origin-destination (O&D) airport, meaning that most enplaned passengers originate their air travel at COS and most deplaned passengers terminate the air travel at COS. Over 90 percent of the Airport's enplaned passengers originate in Colorado Springs, with less than 10 percent of passengers connecting onto other aircraft at COS.

Based on U.S. Department of Transportation statistics, the most common originating airports for passengers traveling to COS in the first quarter of 2021 included Denver, Dallas-Ft. Worth, Houston, Las Vegas, Chicago, Phoenix, and Salt Lake City. As with most hub-and-spoke systems employed by the major air carriers, many passengers start their air travel at a spoke airport like COS and connect onto another aircraft at a hub airport in order to get to their final destination. That process is reversed for passengers arriving at COS.

Commercial Passenger Fleet Mix

The passenger airline fleet serving COS is made up primarily of narrowbody (an airliner arranged along a single aisle, typically permitting up to six seats abreast seating in the cabin) and regional jet aircraft. A breakdown of passenger aircraft serving COS in the first half of 2021 is provided in **Figure 3-12**. By number of operations, the narrowbody aircraft (54 percent) served slightly more flights than the regional jets (46 percent).

Figure 3-12: Passenger Carrier Fleet 2021 (January – June)

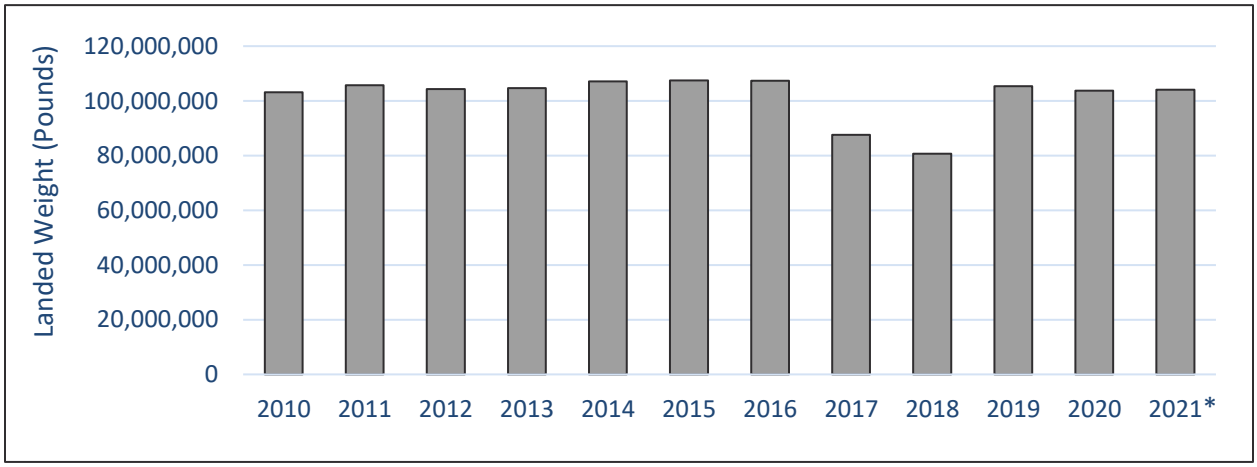


Source: FAA TFMSC

Cargo Activity

COS projects that it will accommodate approximately 104 million pounds of landed weight in air cargo in 2021 (based on actual totals from January through July of 2021 with the remainder of the year estimated). This total is comparable to the previous two years and up substantially from 80.6 million in 2018, which itself was the lowest amount in 10 years (see **Figure 3-13**). Despite the economic recession of the late 2000s and subsequent recovery, the overall past 10 years of cargo activity at COS has remained essentially flat. FedEx serves COS with multiple cargo flights per day, accounting for 95 percent of the Airport's projected landed cargo weight in 2021. FedEx operates a diverse fleet of aircraft that includes the narrowbody Boeing 757 (majority), as well as widebody Boeing 767 and 777, and the DC-10 and MD-11. A small percentage of landed air cargo weight is carried by Key Lime Air (using Fairchild Swearingen Metro aircraft) and only rarely by Atlas Air or UPS.

Figure 3-13: Historical Landed Weight



*2021 includes actual data for January – June and projections for July - December.
Source: Airport records

Aircraft Operations

Colorado Springs Airport accommodates a wide range of aircraft types and users at varying operational levels. Annual aircraft operations represent the number of aircraft takeoffs and landings occurring at an airport during a calendar year. The historical operations data for the Airport includes operations conducted both by based aircraft and itinerant aircraft (i.e., those aircraft arriving from or departing to airports outside the local area). These operations can also be classified into air carrier, air taxi, general aviation, and military categories, as detailed below:

- **Air Carrier:** Air carrier operations are those performed by passenger and all-cargo airlines serving the Airport. Included are scheduled flights, charter flights (including those commercial aircraft destined for the Department of Defense's Arrival/Departure Airfield Control Group [A/DACG] facility), diverted flights, and ferry operations (empty flights). The FAA defines an air carrier aircraft, for traffic counting purposes, as being one capable of carrying more than 60 passengers.

Over the past 20 years, air carrier operations at COS have declined on average 3.5 percent annually and are currently almost half of what they were in 2001. However, with the exception of 2020, operations in this category at COS have recently stabilized and experienced some degree of recovery since 2014. It is anticipated that with the addition of Southwest the annual air carrier operations will surpass totals from the previous five years.

- **Air Taxi:** The air taxi and commuter category consist of unscheduled operations of "for hire" air taxis and the scheduled operations of commuter airlines, including regional affiliate airlines (e.g., SkyWest) operating aircraft with fewer than 60 seats.

  During the 2000s, air taxi operations ranged between 20,000 and 30,000 per year. As part of the decline in commercial service operations at COS, these operations have likewise experienced a decline, currently ranging between 10,000 and 20,000 annually. However, an important contributing factor to this decline is the current trend being experienced in the regional and commuter airline industry of airlines transitioning from 50-60 passenger seat aircraft to 70+ passenger seat aircraft in an effort to enhance efficiency and profitability. This transition to larger aircraft effectively shifts larger commuter aircraft into the air carrier category, which can explain some of the decline experienced recently in this category at COS.

- **General Aviation:** As discussed earlier, general aviation operations encompass all civil aircraft operations not classified as air carrier or air taxi and commuter operations. general aviation operations have been the most dominant category of aircraft operations at COS over the past 20 years. Similar to the air carrier category, general aviation operations today are roughly half of what they were in 2001. From 2015 through 2020, general aviation operations experienced robust growth of 5.9 percent annually. At COS, as well as many airports across the country, general aviation activity experienced a spike in 2020 operations.

- **Military:** Military flights at COS include missions and training operations to/from PSFB as well as exercises that use the facilities at COS that may not be based at PSFB. PSFB is home to the North American Aerospace Defense Command (NORAD), 21st Space Wing, 302nd Airlift Wing and centers of military operations. Military aircraft activity levels are dictated by national defense objectives and have been a consistent presence at COS although annual operations vary.

The basis for COS's historical operational counts are the records maintained by Airport management and the Air Traffic Control Tower (note that tower data is considered to be the best airport operational data currently available since it is based on actual aircraft operations counted by staff). Using data provided by the Airport, **Table 3-6** and **Figure 3-14** present the historical aircraft operations for COS broken down into the operational categories described above.

Table 3-6: Historical Aircraft Operations 2001-2021

Year	Air Carrier	% Air Carrier	Air Taxi	% Air Taxi	General Aviation	% General Aviation	Military	% Military	Total	Annual % Change
2001	25,783	13%	17,423	8%	140,954	68%	22,061	11%	206,221	
2002	22,932	11%	26,381	12%	144,024	66%	24,829	11%	218,166	5.8%
2003	19,571	10%	28,609	14%	105,525	53%	46,831	23%	200,536	-8.1%
2004	18,467	11%	30,684	18%	92,090	53%	33,668	19%	174,909	-12.8%
2005	20,618	12%	27,466	17%	88,295	53%	29,532	18%	165,911	-5.1%
2006	20,162	14%	23,475	17%	74,729	53%	22,592	16%	140,958	-15.0%
2007	20,338	13%	21,497	14%	88,330	57%	25,523	16%	155,688	10.4%
2008	22,742	16%	20,291	14%	73,286	50%	29,014	20%	145,333	-6.7%
2009	20,017	14%	18,318	13%	68,250	47%	38,427	26%	145,012	-0.2%
2010	19,116	14%	17,833	13%	59,124	42%	43,974	31%	140,047	-3.4%
2011	18,831	15%	16,076	13%	55,750	44%	36,107	28%	126,764	-9.5%
2012	17,952	13%	15,013	11%	58,218	43%	42,887	32%	134,070	5.8%
2013	14,521	11%	13,712	11%	60,331	47%	39,092	31%	127,656	-4.8%
2014	13,535	10%	13,830	11%	57,530	44%	45,498	35%	130,393	2.1%
2015	13,921	11%	9,870	8%	57,530	45%	45,498	36%	126,819	-2.7%
2016	12,912	10%	12,287	9%	61,307	47%	43,848	34%	130,354	2.8%
2017	13,628	11%	12,198	10%	59,980	48%	39,576	32%	125,382	-3.8%
2018	13,263	10%	13,418	11%	63,913	50%	37,072	29%	127,666	1.8%
2019	13,740	10%	15,554	11%	72,857	54%	33,280	25%	135,431	6.1%
2020	8,123	7%	10,144	8%	76,510	63%	27,030	22%	121,807	-10.1%
2021 (Jan. – June)	7,971	12%	6,606	10%	40,209	60%	12,522	19%	67,308	
Average Annual Growth Rate										
2001 – 2010	-3.3%		0.3%		-9.2%		8.0%		-4.2%	
2011 – 2020	-8.9%		-5.0%		3.6%		-3.2%		-0.4%	
2001 – 2020	-5.9%		-2.8%		-3.2%		1.1%		-2.7%	

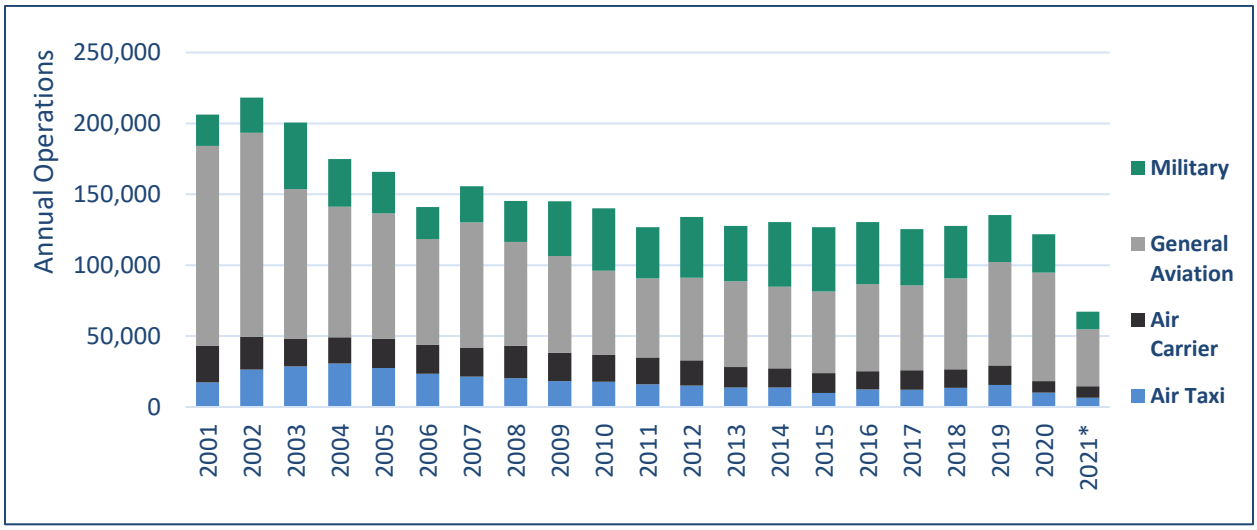
Source: Airport records

Note that the share of each aircraft category as a percent of the total number of operations is also shown in the table above. This is an important consideration in forecasting future operations because the historical trends and future projections on the share of each category will help determine the number of forecasted operations in each category.

Over the past 20 years, the share of air carrier operations at COS have generally declined but stabilized at the 10 to 11 percent level over the past seven years (with the exception of 2020). Since 2015, the share of air taxi operations at COS has slowly grown from 8 percent to approximately 11 percent of total operations. Similarly, the share of general aviation operations at COS has steadily grown from 45 to 60 percent of total operations over the past six years. It is also important to note that while military operations remain a significant contributor to COS activity, they have been declining as a share of total operations since 2015.

Although the relative share of operations within each category has changed over time, they do follow patterns that can be extended into future years or allow for variations given the anticipated profile of activity at COS. These continuing market share trends of COS operations have been applied to future operational projections. Changes in future market share have been based on anticipated changes in the airline industry, classifications of air taxi/commuter aircraft, growing interest of general aviation at COS, and possible wing/unit growth of PSFB.

Figure 3-14: Annual Operations by Category 2001-2021

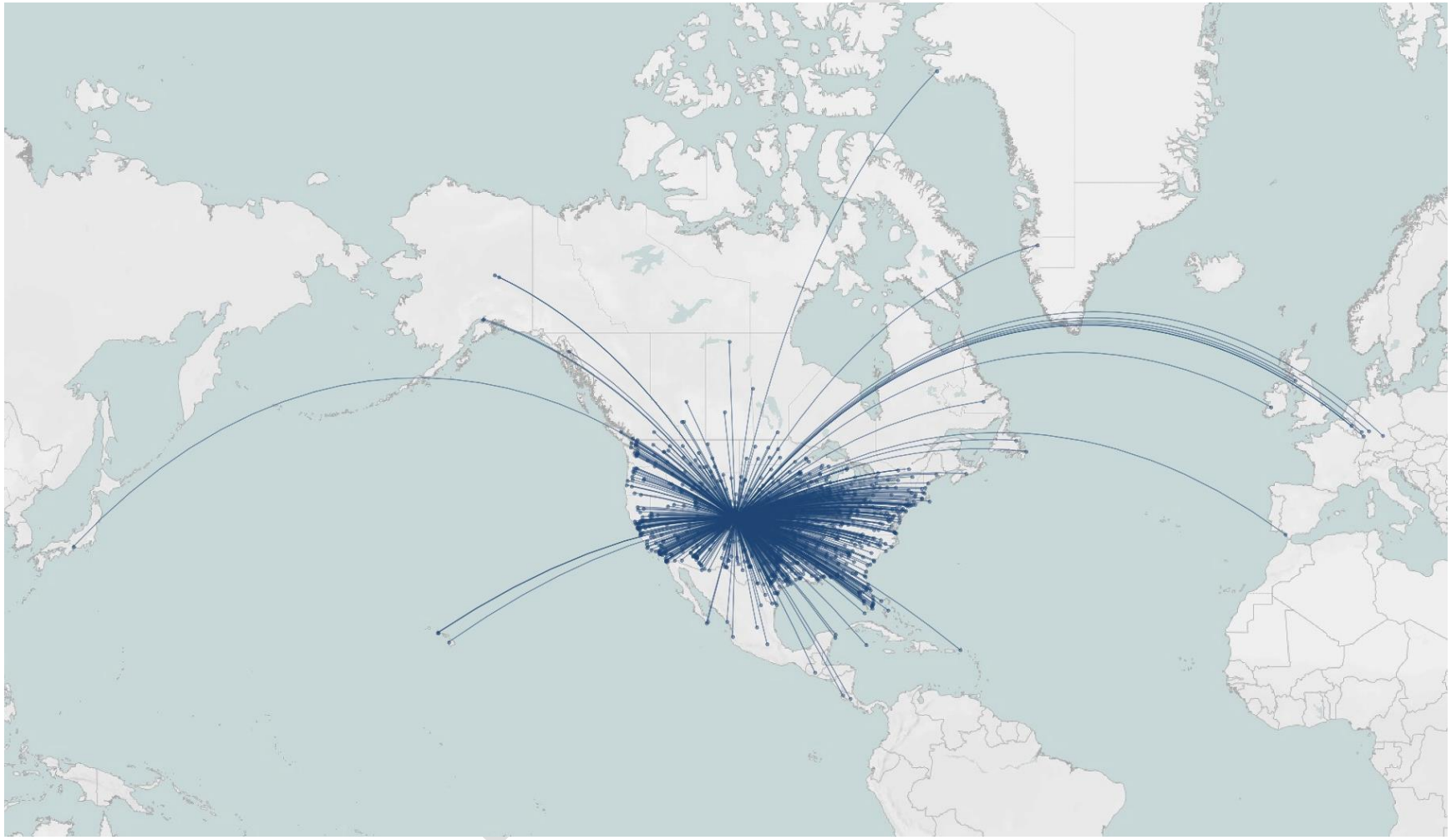


*2021 only includes data for January - June.
Source: Airport records

Flight Origins and Destinations

Data from the FAA's Traffic Flow Management System Counts (TFMSC) database was used to assess origin and destination airports for flights in and out of COS. This data represents only a portion of the total operations at the Airport, but nonetheless provides insight into the national and global reach of the Airport's general aviation activity. In 2019, the TFMSC data listed about 42,000 flights whereas the operation total from the tower was around 135,000. For that subset of flight activity at the Airport, there were 999 unique airports listed as the destination for flights departing COS, and 1,050 unique airports listed as the origin for arriving flights. These destination airports are mapped in **Figure 3-15**. As shown, COS has a global presence with flights reaching as far as Japan, Central America, Canada, Greenland, and Western Europe.

Figure 3-15: COS Flight Destination Map 2019



Source: FAA TFMSC database, Jviation, a Woolpert Company

Based Aircraft

As reflected in the FAA Terminal Area Forecast (TAF) database, the number of based aircraft at COS has fluctuated, but generally increased over the past 20 years (see **Table 3-7**). (Note that since COS is considered a primary airport, it does not follow the requirements of the National Based Aircraft Inventory Program.)

Table 3-7: Historical Based Aircraft 2001-2021

Year	Based Aircraft	Year	Based Aircraft
2001	239	2012	284
2002	172	2013	230
2003	169	2014	230
2004	261	2015	194
2005	261	2016	250
2006	292	2017	242
2007	292	2018	247
2008	292	2019	252
2009	292	2020	257
2010	246	2021	263
2011	246		
Average Annual Growth Rates			
2001 – 2010			-0.3%
2016 – 2020			-0.7%
2001 – 2020			0.4%

Source: FAA TAF

The current breakdown of based aircraft at COS (shown in **Table 3-8**) is provided in the Airport's Master Record (FAA Form 5010) and deviates from the FAA TAF shown above. From 2019 to 2021, 24 based aircraft left COS, 12 of which were military. (Note that there are any number of reasons why a civilian aircraft may change its basing location and military aircraft reallocations to different bases are commonplace.) The Airport anticipates a return of some of the departed based aircraft in the near-term.

Table 3-8: Breakdown of COS Based Aircraft (Airport 5010 Master Record)

Type	Based Aircraft
Single Engine	148
Multi-Engine	40
Jet/Turboprop	32
Helicopter	5
Gliders/Other	1
Military	25
Total	**251**

Source: COS Airport Master Record (Form 5010)

Forecast Methodologies

Projections of aviation activity are typically generated by employing historical data, incorporating assumptions, and considering likely future conditions and trends. In truth, forecasting of any type is as much an "art" as a "science", and no matter how sophisticated, it represents a scientific estimation rooted in the prevailing conditions at the time they are created. Therefore, forecasts must be updated periodically and revised as necessary to reflect new conditions and developments.

During a master planning effort, aviation activity forecasts are typically established by using a variety of assumptions that result in a wide range of outcomes. This is intentionally done in order to provide a broad view of future airport utilization potentials. Once that broad view has been established, then a careful examination of those assumptions can be undertaken to determine which could be most reasonably applied given that airport's current situation.

For COS, several forecasts were developed based on a variety of different analytical techniques including direct correlation projections, regression analyses, a market share analysis, and various trendline analyses. Consistent with industry standards, these methodologies incorporate national trends and consider the FAA's Terminal Area Forecast to create projections for COS aviation activity categories including **passenger enplanements, air cargo, aircraft operations,** and **based aircraft**. Not all methodologies are applicable to each category and may be duplicative with other methodologies. From the methodologies used for each category of activity, *a select group of projections was chosen to represent low, medium, and high growth scenarios*. A description of each methodology and the category of activity it applies to are discussed below.

- **FAA Terminal Area Forecast (TAF) (2021-2041):** The TAF is the official FAA forecast of aviation activity for U.S. Airports, both in aggregate and individually. It addresses historical and forecasted airport operations, based aircraft, enplanements, and air cargo miles and tonnage. This methodology applies to all categories of activity.

- **Colorado Airport System Plan (CASP) Forecasts 2018-2038 (Operations and Based Aircraft AAGR):** The 2020 CASP included enplanement, operational and based aircraft forecasts for airports throughout Colorado. These are based on local and regional data from socioeconomic and aeronautical sources. This methodology applies to operations and based aircraft categories of activity.

- **FAA Historical Scheduled Domestic Passenger Traffic 2010-2021 (FAA Aerospace Forecasts FY 2021-2041):** FAA Aerospace Forecasts for the U.S. are published annually and are developed using statistical models to explain and incorporate emerging trends of the different aviation sectors. This

forecast is based on historical enplaned passenger traffic growth or decline percentages. This methodology applies to enplanement projections.

- **FAA Forecast Scheduled Domestic Passenger Traffic 2021-2041 (FAA Aerospace Forecasts FY 2021-2041):** FAA Aerospace Forecasts are published annually and developed using statistical models to explain and incorporate emerging trends within the different aviation sectors. This methodology is based on projected domestic passenger traffic growth or decline percentages and applies to enplanement projections.

- **FAA Active General Aviation and Air Taxi Total Hours Flown (FAA Aerospace Forecasts FY 2021-2041):** This forecast considers all general aviation and air taxi hours, which include both piston and turbine aircraft. (Note that air taxi includes general aviation air charter operations and applies to operations and based aircraft projections.)

- **FAA Active General Aviation and Air Taxi Turbine Hours Flown (FAA Aerospace Forecasts FY 2021-2041):** This forecast includes all general aviation and air taxi hours flown for turbine aircraft only. (Note that air taxi includes general aviation air charter operations and applies to operations and based aircraft projections.)

- **FAA Forecast of Jet Fuel Prices 2021-2041 (FAA Aerospace Forecast FY 2021-2041):** This forecast is based on projected growth or decline rates of Jet Fuel (Jet-A) pricing during the 20-year forecast period within the United States. This methodology applies to all categories of activity.

- **Jet-A Fuel Flowage Forecast (FAA Aerospace Forecast FY 2021-2041):** This forecast is based only on Jet-A fuel estimated to be pumped nationally during the forecast period. Jet-A is the fuel utilized by turbine aircraft, including all commercial passenger air carriers at COS. This methodology applies to all categories of activity.

- **Total Combined Fuel Flowage Forecast (FAA Aerospace Forecast FY 2021-2041):** This forecast is based on combined totals of Jet-A and 100LL fuel estimated to be pumped nationally during the forecast period. Jet-A is the fuel utilized by turbine aircraft while 100LL is the fuel utilized by piston-powered aircraft. This methodology applies to all categories of activity.

- **Active General Aviation Aircraft (FAA Aerospace Forecast FY 2021-2041):** This forecast is based on all estimated levels of active general aviation aircraft operating in the United States during the forecast period. This methodology applies to based aircraft projections.

- **FAA Forecast Active Turbine Aircraft (FAA Aerospace Forecast FY 2021-2041):** This forecast is based on estimated levels of active turbine general aviation aircraft operating in the United States during the forecast period. This methodology applies to all categories of activity.

- **Market Area Historical Population Growth 2001-2020:** This forecast is based on growth rates from Colorado DOLA historical population data for the airport market area which includes both El Paso and Teller Counties. This methodology applies to all categories of activity.

- **Market Area Forecasted Population Growth 2021-2041:** This forecast is based on growth rate founded on forecasted Colorado DOLA population data for the airport market area. This methodology applies to all categories of activity.

- **Market Area Historical Employment 2001-2020:** This forecast is based on growth rates from Colorado DOLA historical employment data for the airport market area. This methodology applies to all categories of activity.

- **Market Area Forecasted Employment 2021-2041:** This forecast is based on growth rates from Colorado DOLA forecasted employment data for the airport market area. This methodology applies to all categories of activity.

- **Load Factor Analysis:** This methodology incorporates historical trends of commercial service load factors and looks at projections of future load factors. This methodology may be applied to commercial service enplanements.

- **Trend Analysis:** This forecast methodology assumes that the historical trend of activity in each category will continue. This methodology may be applied to all activity categories based on the reasonableness of the projection given expected national industry trends and an understanding of local influencing factors.

Projections of Passenger Enplanements

Projection Assumptions

In developing the projections of enplaned passengers at COS the following assumptions were made:

- The quality and quantity of service will continue to improve at COS in concert with the expanded service of Southwest Airlines leading to rising passenger volumes and an increased propensity of local residents to fly.

- The addition of Southwest will stimulate other carriers in a more competitive market.

- The major U.S. airlines will maintain hub operations at their primary U.S. airports; if one or more of the major U.S. airlines were to experience a dramatic change (such as a merger), other carriers will continue to serve the demand associated with the COS market area.

- The existing role of the Airport will remain the same in the future - that is, the growth of Airport's use will be reflective on the growth of the market area.

- Frontier Airlines will have a reduced and lessening effect on market area passengers as COS gains additional low fare service and is impacted by those carriers' new fare structures.
- The Airport's level of air service and traffic will continue to be based on local demand and O&D in nature; the level of connecting service at COS will continue to be minimal. (Note that if an airline located a hub operation at COS, it would increase the level of scheduled service at the Airport.)
- Limited nonstop scheduled international flights may be introduced at COS, but will not be a significant factor in overall traffic volumes.
- The capacity of the COS airside and landside facilities will not constrain the realization of air travel potential during the forecast period.

Enplanement Projections

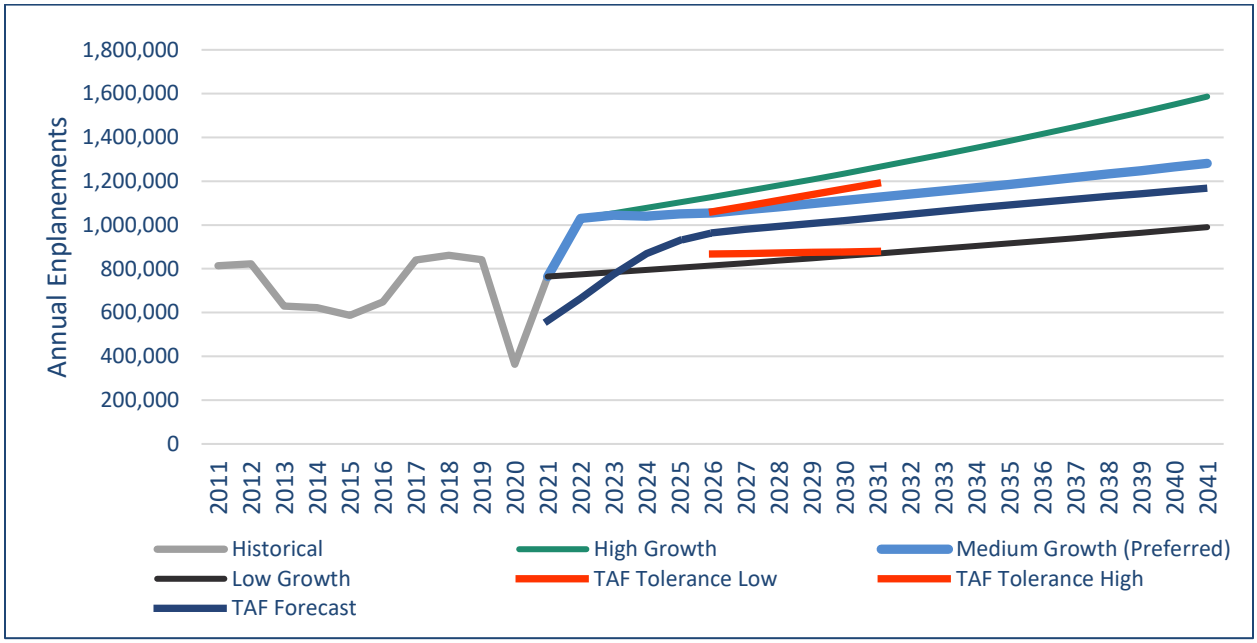
The various methodologies discussed in the previous section were applied to the estimated 2021 base year enplanement levels to produce a broad range of 20-year projections. Methodologies were then reviewed for reasonableness and likelihood. The FAA requires that study-related forecasts present their consistency with the existing TAF or demonstrate the rationale for any significant deviation. Specifically, the FAA considers a forecast to be consistent with its TAF for forecasts differing by less than 10 percent within five years of the base forecast year, and 15 percent within 10 years of the base year. The TAF projection, as well as the high and low variance ranges, are reflected in the projection graphs and represented by dashed lines.

A projection for enplanements in 2021 and 2022 was created by internal airport staff. For 2021, the projection was built on the recorded enplanements from the first half of the year and commercial flight schedules for the second half. This resulted in a projected total of 764,627 enplanements for 2021. The 2022 enplanement projection was based on 2021 data and other historical trends, load factors, and commercial service schedules. The projected enplanements for 2022 are 1,029,918. This projection assumes continued growth and increased load factors, including those by Southwest Airlines.

Scenario Based Forecasting

In an effort to narrow the range of forecasting options noted above, three forecast scenarios were selected as being representative of the reasonable range of enplanement forecasts available for COS; they are shown in **Figure 3-16.** Note that the COS forecast is portrayed as a "range" in order to better account for the variabilities that are inherent in any forecasting effort.

Figure 3-16: Scenario Based Enplanement Forecast 2021-2041



Source: Jviation

The three forecasts shown above and described below were selected to represent high-, medium-, and low-growth enplanement forecast scenarios.

1. **High-Growth Scenario** – This scenario utilizes the Airport's internal 2021 and 2022 projections. After 2022, this scenario grows based on the FAA forecast of total scheduled domestic passenger traffic (FAA Aerospace Forecast FY 2021-2041), which represents a 2.3 percent average annual growth rate throughout the 20-year planning period. This forecast is a key indicator of the FAA's positive national outlook on the growth of passenger activity recovery. Since this projection is focused on passenger levels, it is reasonable to include anticipated national passenger projections as one of the scenarios representing COS's potential future passenger growth.

   The high growth scenario projects a total of 1,586,497 enplanements by the year 2041. To achieve these levels, new routes and/or expanded service by existing mainline carriers would be required, and/or a new carrier would have to enter the market. This projection is higher than the upper threshold of the FAA TAF at the five and ten-year marks.

2. **Medium-Growth Scenario** – This scenario also starts with the Airport's 2021 and 2022 enplanement projections. From 2023 through 2026, small incremental load factor increases are assumed (1.0 percent in the first year, and 0.5 percent for each subsequent year). Following this period, projections increase from 2027 through 2041 based on the forecasted population growth in the COS market area, as detailed by the Colorado DOLA. The market area forecasted population methodology represents a 1.3 percent average annual growth rate, resulting in a projected 1,281,280 enplanements by 2041. This

scenario is slightly more conservative than the high-growth scenario but would also likely require expanded service at COS that would result from growth in the local population base and/or its propensity to fly. Based on the focus of growth within the region and the integration of population as a common forecasting variable, it is reasonable to include this as one of the scenarios representing COS's potential future growth. The medium growth projection is consistent with the short and medium term projections found in the FAA TAF.

3. **Low-Growth Scenario** – This scenario utilizes the 2021 enplanement forecast but does not assume the Airport's optimistic 2022 projection. In the low-growth scenario, enplanements grow for the entire period at the projected 1.3 percent annual average growth rate of the population growth. This scenario is notably more conservative than the others, resulting in 990,007 enplanements by 2041. This scenario could be representative of a number of real-world scenarios that may occur, such as a resurgence of COVID virus variants, increased passenger hesitancy to fly, or reduction in service by a carrier. This projection falls below the FAA TAF thresholds.

Preferred Enplanement Forecast

The Medium-Growth Scenario (Market Area Forecasted Population Growth) was selected as the preferred forecast since it considers anticipated population growth generated by the Colorado DOLA containing a reasonable basis of local and regional input. Population within the region has a strong correlation to the demand for air carrier service at COS. As population within the area increases, so too will the need for reliable, effective air passenger service.

While some area residents may be willing to travel to Denver International Airport (DEN) for additional flight options or more competitive fares, growth in the market area could reasonably attract additional service at COS that would counteract come of the attraction of DEN. Additionally, the Denver metroplex expands and the I-25 corridor becomes more congested, traveling to DEN will become less attractive and flight options to/from COS more appealing. The preferred passenger enplanement forecast for short, medium, and long-term intervals within the 20-planning horizon is compared to the 2020 FAA TAF for COS in **Table 3-9**.

Table 3-9: Preferred Enplanement Forecast

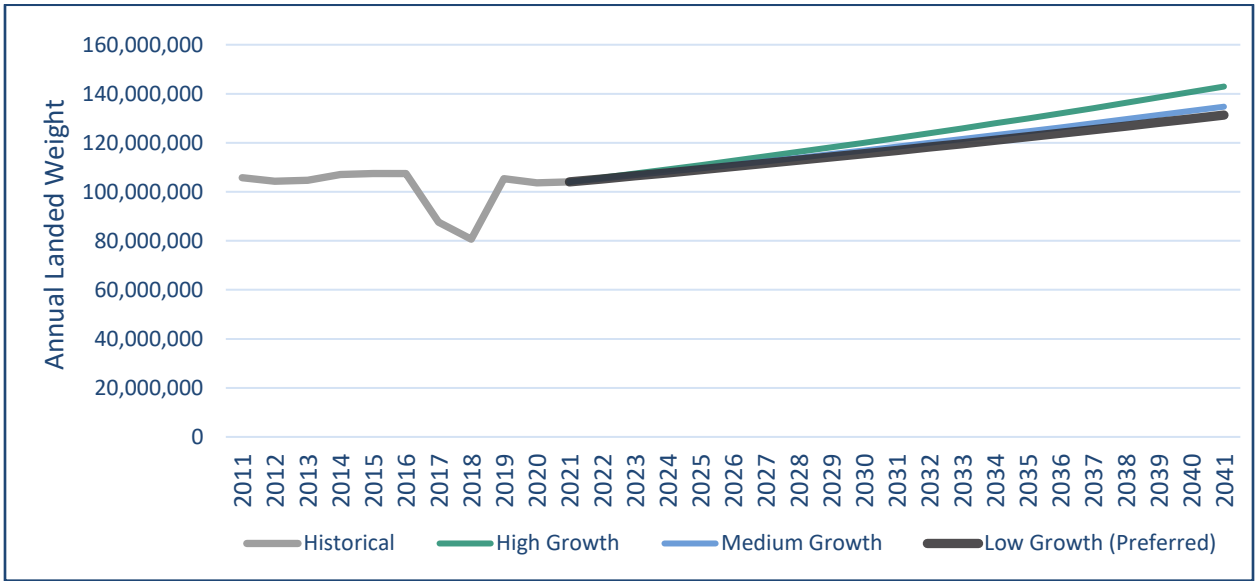
Year	Preferred Forecast	2020 FAA TAF	Variance
2021	764,627	562,789	35.9%
2026	1,055,606	964,015	9.5%
2031	1,126,028	1,034,958	8.8%
2036	1,201,148	1,104,349	8.8%
2041	1,281,280	1,168,161	9.7%
Average Annual Growth Rate			
2021 - 2041	2.6%	3.7%	

Source: Jviation, a Woolpert Company, and FAA TAF

Projections of Air Cargo Volume

A similar broad range of methodologies were applied to air cargo landed weight to forecast 20-year levels at COS. **Figure 3-17** presents the high, medium, and low growth scenarios resulting from the application of those methodologies. The FAA does not forecast individual airport air cargo activity or volume, so there are no TAF projections nor recommended tolerances to consider. As shown, there is less variance between the cargo scenarios as compared to the enplanement scenarios.

Figure 3-17: Scenario-Based Air Cargo Forecast 2021-2041



Source: Jviation, A Woolpert Company

The three growth scenarios selected for air cargo landed weight are described below:

1. **High-Growth Scenario** – The high-growth scenario begins at the projected 2021 baseline landed weight and then grows through 2041 at the FAA average annual forecast domestic air cargo carrier revenue ton-miles growth rate of 1.6 percent. National trends of air cargo paint a general picture of the industry and are thus applicable to COS. Air cargo volume in this scenario is projected to grow slightly more than the other scenarios, resulting in a projected 143 million landed pounds by 2041. Increased use of COS for air cargo flights would be required to reach this volume, which is about 35 percent more than current day levels. This forecast is indicative of a significant expansion of the COS air cargo market area, with possible air cargo hub activity and/or a new entrant.

2. **Medium-Growth Scenario** – This scenario is based on the projected population growth in the market area at a 1.3 percent average annual growth rate throughout the 20-year planning period. This growth scenario projects a total of nearly 135 million pounds of landed air cargo weight by the year 2041.

3. **Low-Growth Scenario** – This scenario is based on the forecasted employment growth in the COS market area, as projected by the Colorado DOLA. The market area forecasted employment methodology represents a 1.2 percent average annual growth rate. This forecast applies the expected growth in market area employment to the baseline COS cargo landed weight to project an expected level of over 131 million pounds by 2041. This scenario may require expanded service at COS that would come with a growth in the local population and employment base. Based on the focus of growth within the region and the integration of employment as a common forecasting variable, it is reasonable to include this as one of the scenarios representing COS's potential future growth.

Preferred Air Cargo Forecast

The Medium-Growth Scenario (Market Area Forecasted Population Growth) was selected as the preferred forecast since it considers anticipated growth generated by market area population and the general growth of the region. Population within the region likely has a strong correlation to the demand for air cargo service at COS. As the area expands and demand for goods grows, so too will the need for reliable, convenient, and effective air cargo service. The preferred air cargo forecast for short-, medium-, and long-term intervals within the 20-planning horizon is shown in **Table 3-10**.

Table 3-10: Preferred Air Cargo Forecast

Year	Preferred Forecast
2021	104,047,500
2026	110,988,729
2031	118,393,021
2036	126,291,270
2041	134,716,427
Average Annual Growth Rate	
2021 - 2041	1.3%

Source: Jviation, a Woolpert Company

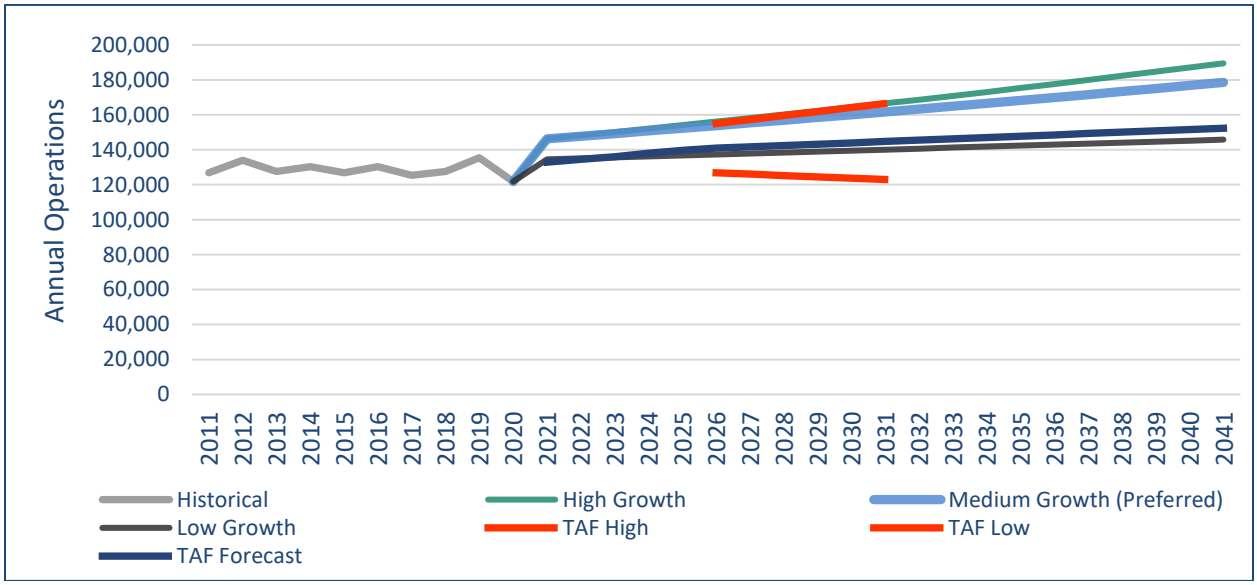
Projections of Aircraft Operations

Generally, the most important activity forecast for airfield planning is the level and type of aircraft demand generated at the airport, which is measured by aircraft operations. An aircraft operation is defined as either a takeoff or a landing of an aircraft, and ultimately serves as the basis for selecting the critical aircraft, discussed later in the chapter. Due to the impacts on airport operations resulting from the pandemic, a customized methodology was employed to establish the

baseline number of aircraft operations at COS for 2021. To help ensure this baseline was consistent with historical patterns while also not disregarding the potential impacts of the pandemic, a correlation of the actual COS operational counts (from January through June of 2021) was drawn with those over similar months over the previous five years. This resulted in a determination that January through June represented an average of 46 percent of the total annual operations experienced at COS. Based on this, the 2021 baseline aircraft operational level for COS was established as 146,322 operations. Note that this total is consistent with previous years while also accounting for the increase in general aviation operations experienced due to the pandemic.

Based on the forecast methodologies presented in a previous section, three aircraft operational forecast scenarios for COS were identified and forecasts were generated. These are shown in **Figure 3-18** and represent the range of forecasting options.

Figure 3-18: Scenario-Based Aircraft Operations Forecast 2021-2041



Source: Jviation, A Woolpert Company

The three growth scenarios selected for total aircraft operations at COS are described below:

1. **<u>High-Growth Scenario</u>** – This scenario is based on the forecasted population growth for the market area over the 20-year planning period and represents a 1.3 percent average annual growth rate. The forecast assumes aircraft activity will increase at a rate consistent with the number of residents in the area. Growth to this degree would likely be consistent with airline expansion, business jet growth, and increased mission activity from Peterson Space Force Base. This growth scenario projects a total of approximately 189,000 total aircraft operations by the year 2041, which exceeds the TAF thresholds.

2. **Medium-Growth Scenario** – This scenario is based on the FAA's forecast of total hours flown by all aircraft in the country and represents a 1.0 percent average annual growth rate. It is symbolic of the expected growth of all categories of aviation and incorporates the utilization of aircraft by their owners. Application of this scenario's growth rate to the current COS operation levels results in approximately 175,000 annual aircraft operations by 2041. This scenario may require some level of expanded service, as well as increased based aircraft and military activity, but to a lesser degree than the high-growth scenario. This forecast is consistent with the projections found in the FAA TAF.

3. **Low-Growth Scenario** – Historic aviation levels are often a strong predictor for future activity. This scenario starts with a lower baseline level of operations of 134,616 aircraft operations for 2021 which is equal to the first six months accounting for 50 percent of the annual total rather than the 46 percent derived based on the five-year historical average. (This modification reflects the potential that the second half of 2021 will result in less aggressive activity levels than those included in the previous scenarios). The operations then increase based on the rate (0.4 percent annually) that aircraft operations increased at the Airport from 2011 through 2020. Total COS aircraft operations projected under this scenario result in approximately 146,000 by 2041. This scenario is within the thresholds for the short- and medium-term found in the TAF.

Preferred Aircraft Operations Forecast

The Medium-Growth Scenario (Hours Flown) was selected as the preferred forecast since hours flown is one of the best correlations of operational activity levels. While some categories of activity at COS may decline during the 20-year planning period, others will increase and counteract any declining segments (as seen in 2020 with fewer military operations offset by higher general aviation operational counts). Operations will also increase from expanded transient activity, increased usage of local based aircraft, as well as the addition of more based aircraft at the Airport.

A comparison of the preferred aircraft operations forecast for short, medium, and long term intervals with the 2020 FAA TAF has been provided in **Table 3-11**. As with the enplanement projections, the FAA requires that operational forecasts present their consistency with the existing TAF or demonstrate the rationale of any significant deviation. As shown below, the preferred aircraft operations forecast lies within the TAF thresholds and therefore no additional rationale is required to be provided to the FAA.

Table 3-11: Preferred Operations Forecast

Year	Preferred Forecast	2020 FAA TAF	Variance
2021	146,322	132,911	10.1%
2026	153,787	140,905	9.1%
2031	161,631	144,701	11.7%
2036	169,875	148,532	14.4%
2041	178,541	152,311	17.2%
Average Annual Growth Rate			
2021 - 2041	1.0%	0.7%	

Source: Jviation

Breakdown of Aircraft Operations by Category

Breaking down future aircraft operations by category (e.g., air carrier, air taxi, general aviation, and military) provides additional definition to the forecasted levels of operations. By applying historical market share percentages as well as possible changes in the classification of aircraft and focus of aviation by particular COS user groups, estimated operations by category were established and are shown in **Table 3-12.**

Table 3-12: Operations Forecast by Category

Year	Air Carrier	% Air Carrier	Air Taxi	% Air Taxi	General Aviation	% General Aviation	Military	% Military	Total
2021	13,169	9%	14,632	10%	86,330	59%	32,191	22%	146,322
2026	16,917	11%	13,841	9%	86,121	56%	36,909	24%	153,787
2031	19,396	12%	12,930	8%	88,897	55%	40,408	25%	161,631
2036	22,084	13%	11,891	7%	91,733	54%	44,168	26%	169,875
2041	24,996	14%	10,712	6%	94,627	53%	48,206	27%	178,541
Average Annual Growth Rate									
2021 - 2041	3.3%	-	-1.5%	-	0.5%	-	2.0%	-	1.0%

Source: Jviation, a Woolpert Company

Air Carrier

As the region continues to grow and the demand for air service increases, the number of air carrier operations will likely expand accordingly (the addition of Southwest Airlines has already resulted in new air carrier operations). COS has had longstanding commercial passenger service and the region has demonstrated that demand for reliable scheduled service is significant enough to support multiple air carriers. As air carriers in general focus on becoming more efficient and profitable, larger aircraft will become a more prevalent element of the airlines' aircraft fleets. Aircraft such as the Boeing 737, Airbus A319 and A320, and larger regional jets (60+ seats) are anticipated to increase in frequency throughout the 20-year period. It is also estimated that air carrier aircraft will increase their share of total aircraft operations at COS from 9 percent to 14 percent.

Air Taxi

Air taxi and commuter operations consist of unscheduled operations of "for hire" air taxis and the scheduled operations of commuter airlines, including regional affiliate airlines operating aircraft with fewer than 60 seats. Regional and commuter airlines continue to transition from 50-60 passenger seat aircraft to 70+ passenger seat aircraft, which effectively shifts larger commuter aircraft from the air taxi category to the air carrier category. This transition is evident in the forecasted declining percentage of air taxi operations within the COS fleet mix. While there may continue to be a significant number of operations in this category throughout the planning period, their percent share of total operations at COS will likely decline significantly. However, much of this decline will result from the categorization of aircraft and not an actual reduction in passenger demand. Airlines will simply be using larger aircraft in years ahead.

General Aviation

General aviation is the largest and most varied category of operations at COS. That trend is expected to continue, although with a different focus. As national trends continue of increasing business jet operations and declining smaller private/recreational aircraft operations, the general aviation landscape at COS will likely change accordingly. The share of general aviation operations at COS increased dramatically from 54 percent in 2019 to 63 percent in 2020. It is anticipated that this increased share will slowly regress to pre-pandemic levels, but nevertheless remain more than half of all COS operations throughout the planning period.

Military

The role of the military at COS is difficult to predict given the uncertainty of mission priorities and Department of Defense objectives. With PSFB being home to the 21st Space Wing (among other groups) and the 302nd Airlift Wing (Reserve), there is a strong probability that military operations at COS could expand in the future. The share of military operations at the Airport decreased in 2020, falling from 25 percent in 2019 down to 22 percent in 2020. It is expected that military operations at COS will return to pre-pandemic levels in the upcoming years. Given this likelihood and the on-going interest by PSFB to expand into areas surrounding the Airport, the share of future military operations at COS are estimated to increase to 27 percent by the year 2041.

Split of Local and Itinerant Operations

This forecast also includes a breakdown of forecasted operations into local and transient activities. Local operations are those performed by aircraft that are based at COS and operate in the local traffic pattern and/or within sight of the Airport. These operations also include simulated instrument approach flight training and departures to or arrivals from practice areas within a 20-mile distance from the Airport. Itinerant or transient operations are operations by aircraft that leave the local airspace, including those based at other airports. The

results from the preferred scenarios for local and itinerant operations at COS for the planning period (2021-2041) are presented in **Table 3-13.** Any variation in the percentage split between local and itinerant operations over time would be an indication of a change in nature of operations at an airport. Since no such fundamental changes are anticipated at COS, the percentages are projected to remain static throughout the planning period.

Table 3-13: Local and Itinerant Spilt

Year	Local	Itinerant	Total
2021	39,507	106,815	146,322
2026	41,522	112,265	153,787
2031	43,640	117,991	161,631
2036	45,866	124,009	169,875
2041	48,206	130,335	178,541
Percent Share	27%	73%	

Source: Jviation, a Woolpert Company

Operations by Runway End

By using annual flight track data collected as part of the 2019 COS Land Use Study, it is possible to estimate the number of existing and forecasted operations by runway end at COS. The results of this analysis are presented below in **Table 3-14** and reflect a full year (Oct 2018 to Sept 2019) of flight track data from the FAA to estimate the overall percentage of use for each runway at the Airport. The percentages of existing use have been applied to future years to predict the number of operations for each runway end at key points within the planning period.

Table 3-14: Operations by Runway End

Year	Runway 13	Runway 31	Runway 17L	Runway 17R	Runway 35L	Runway 35R	
	5%	4%	26%	29%	18%	18%	Total
2021	7,316	5,853	38,044	42,433	26,338	26,338	146,322
2026	7,689	6,151	39,985	44,598	27,682	27,682	153,787
2031	8,082	6,465	42,024	46,873	29,094	29,094	161,631
2036	8,494	6,795	44,168	49,264	30,578	30,578	169,875
2041	8,927	7,142	46,421	51,777	32,137	32,137	178,541

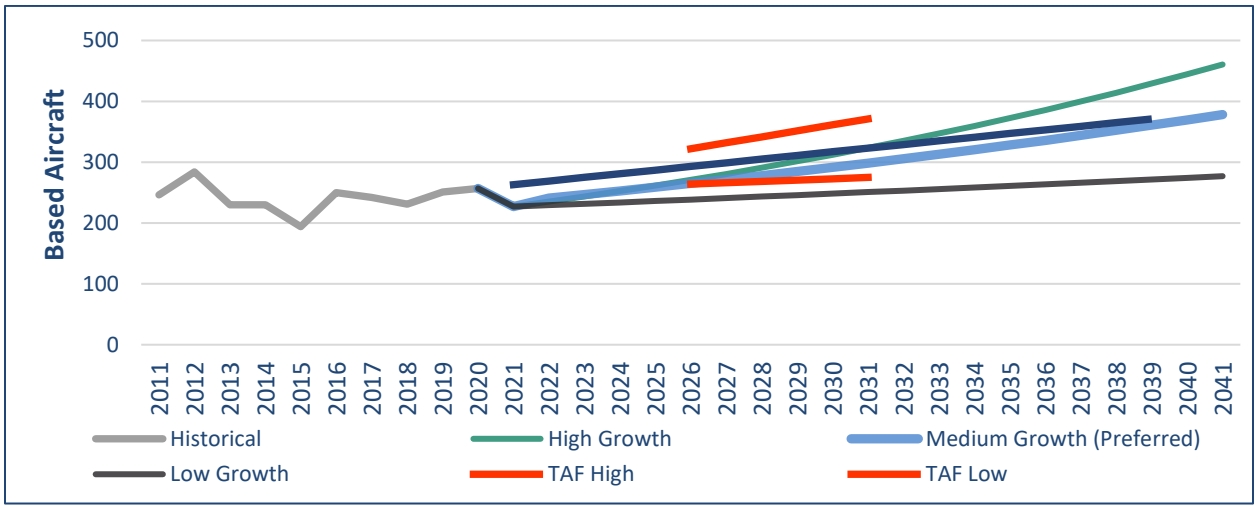
Source: Jviation, a Woolpert Company, ATAC

Based Aircraft Projections

The based aircraft forecast helps determine the future activity levels and the potential requirement for expanded or improved airport facilities. Based aircraft are defined as those that are permanently stored at an airport. Estimating the number and types of aircraft expected to be based at COS over the 20-year study period will impact the planning for future Airport facility and infrastructure requirements, particularly as they relate to general aviation activities. As the number of aircraft based at an airport increases, so too does the aircraft storage required as well as supporting infrastructure and services.

According to the Airport's Master Record (FAA Form 5010), COS currently has 227 based aircraft, which was used as the 2021 baseline for projecting future based aircraft totals. The overall number of based aircraft at COS decreased by 24 from 2019 to 2021, with 12 being military aircraft. The precise reasons for this reduction are unknown, but based on recent inquiries at the Airport, a return to pre-pandemic levels of based aircraft is anticipated. The results of the scenario range for based aircraft at COS over the planning period are presented graphically below in **Figure 3-19**.

Figure 3-19: Scenario-Based Based Aircraft Forecast 2021-2041



Source: Jviation, a Woolpert Company

The three forecasts shown above were selected to represent high-, medium-, and low-growth based aircraft forecast scenarios. These are reflected in the following:

1. **High-Growth Scenario** – This scenario is based on the FAA Forecast Jet-A Fuel Flowage growth rate (3.6 percent average annual growth rate). This growth rate represents regional socioeconomic data projections and national aviation industry expectations for Jet-A fuel sales (reflecting the growth of turbine aircraft based at COS). This is the most optimistic scenario, projecting based aircraft at the Airport to reach 460 by 2041. To accommodate this growth, the Airport would require a significant amount of capital improvements, mainly in the form of new hangars and associated infrastructure.

2. **Medium-Growth Scenario** – Following the drop in the number of based aircraft over the past year, this scenario assumes a rebound over the next year (from 227 to 241) as roughly half of the departed aircraft return during pandemic recovery. After 2022, based aircraft are then forecasted to grow at 2.4 percent average annual rate based on the FAA forecast of national terminal radar approach control facility (TRACON) operations from 2021 to 2041. Note that based aircraft and the number of aircraft operations are typically highly correlated, so as TRACON operations, it is reasonable to assume that the number of based aircraft will increase proportionally. There

is a TRACON located at COS as well as nearby DEN and in Aspen that provide very accurate data for the area market. This scenario is notably more conservative than the high-growth scenario (projecting 378 based aircraft by 2041) and is consistent with the short- and medium-term projections found in the FAA TAF.

3. **Low-Growth Scenario** – This scenario is based on the FAA's forecast of total hours flown by all aircraft in the country. It is symbolic of the expected growth of all categories of aviation and incorporates the utilization of aircraft by their owners. The FAA hours flown methodology represents a 1.0 percent average annual growth rate. In applying this growth rate to the current number of based aircraft at COS, it is projected that based aircraft will increase to 272 aircraft by 2041. This projection falls below the FAA TAF thresholds.

Preferred Based Aircraft Forecast

The Medium-Growth model (TRACON Operations) was selected as the preferred forecast for the total based aircraft fleet at COS. The total based aircraft projected for COS over the planning period were then allocated to six general aircraft categories (single-engine piston, multi-engine piston, turbine/jet, military, helicopter, and other) to develop a projection of COS's based aircraft fleet mix throughout the planning period. The existing fleet mix was developed based on the fleet mix percentages reported by the Airport Master Record in August 2021. Through the forecasting process, and based on anticipated migrations of the fleet, those percentages are anticipated to change over the long-term. Those based aircraft totals and fleet mix percentages for COS are shown in **Table 3-15.**

Table 3-15: Based Aircraft Forecast by Type

Year	2021	2026	2031	2036	2041
Single Engine	154	164	167	175	189
Percent of Total	68%	62%	56%	52%	50%
Multi-Engine	35	32	39	44	42
Percent of Total	15%	12%	13%	13%	11%
Jet/Turboprop	22	34	48	60	72
Percent of Total	10%	13%	16%	18%	19%
Helicopter	2	6	7	10	15
Percent of Total	1%	2.4%	2.4%	3%	4%
Glider/Other	2	2	2	3	4
Percent of Total	0.9%	0.6%	0.6%	1%	1%
Military	12	26	36	44	57
Percent of Total	5%	10%	12%	13%	15%
Total Aircraft	**227**	**265**	**298**	**336**	**378**

Source: Jviation, a Woolpert Company

Given the business development opportunities being presented in this business-friendly community through proactive economic initiatives, projected population and economic growth, and the anticipated resultant market area benefits, it is likely that COS will follow, if not exceed, national trends with respect to aircraft

market share and experience an influx of business aircraft and helicopters. The fleet mix projection shows an increasing role for turbines/jets at the Airport over the planning period, which is consistent with FAA projections within the general aviation market segment where the declining market share of single and multi-engine piston aircraft will be replaced by turbines/jet aircraft used for business travel. The forecast also includes an increase in military presence and activity at COS.

Peaking Characteristics

Peak period activity is important in the process of determining the facility requirements at an airport in that it helps determine the optimum sizing of terminal facilities, landside facilities, airfield capacities, and other considerations. In this analysis, three specific peak periods were used to determine what size facilities may be needed to meet forecasted demand; these included peak month, average day of the peak month, and peak hour operations and enplanements. Following are definitions of each:

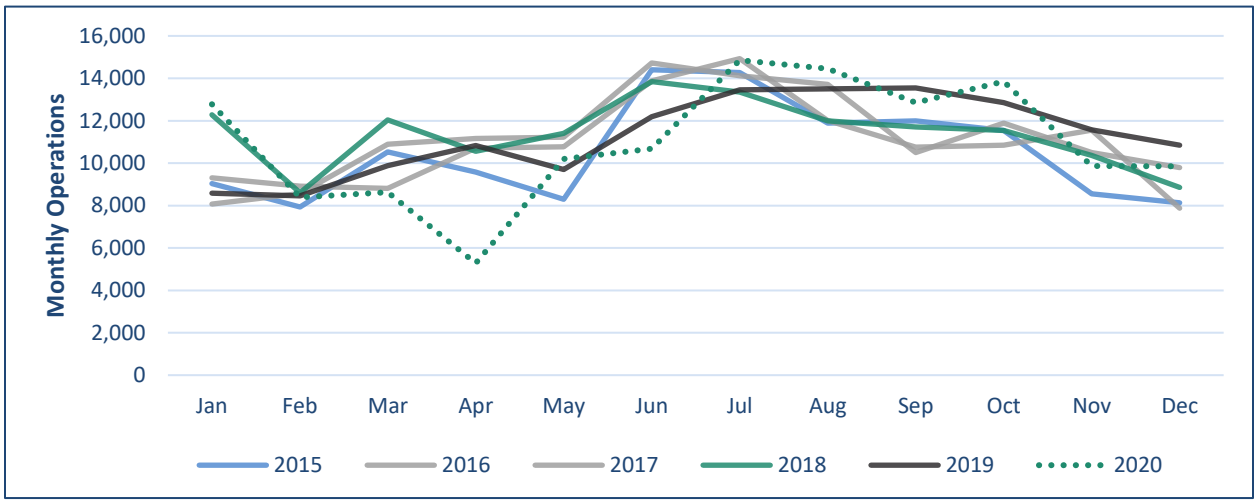
- **Peak Month:** The month during which the most aircraft operations/enplanements occur.
- **Peak Month Average Day (PMAD):** Aircraft and passenger activity that can be expected on a typical day during the peak month.
- **Peak Hour:** The hour during which most activity occurs within the average day of the peak month.

These peaking characteristics are estimated for aircraft operations and passenger activity for current levels as well the planning period years of 2026, 2031, 2036, and 2041.

Seasonality of Operations

Determining the seasonality of operations is an important part of determining the peak level of activity for an airport. **Figure 3-20** illustrates the seasonal characteristics of operations at COS over the past five years. Specifically, the figure shows that the June/July timeframe is typically the peak season of flight activity with the share of operations during those months averaging 11 percent of annual operations. Activity slightly declines during the winter months and typically represents six to seven percent of annual operations.

Figure 3-20: Seasonality of Total Operations 2015-2020



Source: Airport records

Peak Aircraft Operations

Airport traffic displays peaking characteristics by month of the year, by day of the week, and by the hour of the day. Operational traffic levels at COS are fairly spread out over the year, although summer months represent the busiest season due to increased summer vacation leisure travel and fair-weather flying conditions. Total PMAD operations are projected to increase from an estimated 485 to 640 over the course of the planning period.

Table 3-16 shows the peak period operations for each category of traffic at COS: Air Carrier/Air Taxi (combined), General Aviation, and Military. During the development of peak hour estimates, discussions with the Air Traffic Control Tower (ATCT) revealed strong operational peak periods during the morning hours followed by slower periods until the afternoon. Based on this information as well as generalized planning standards that suggests that 12 to 20 percent of daily activity be assigned to the peak hour, a 15 percent allocation was applied to PMAD level to determine peak hour levels for COS. By applying this methodology and calculating each segment of traffic, it was determined that the total peak hour PMAD operations were projected to increase from 80 to 98 from 2021 to 2041.

Table 3-16: Peak Period Operations Projections

Category / Year	Annual	Peak Month	Average Day	Peak Hour
Air Carrier & Air Taxi				
2021	27,801	3,058	102	15
2026	30,757	3,383	113	17
2031	32,326	3,556	119	18
2036	33,975	3,737	125	19
2041	35,708	3,928	131	20
General Aviation				
2021	86,330	9,496	317	47
2026	86,121	9,473	316	47
2031	88,897	9,779	326	49
2036	91,733	10,091	336	50
2041	94,627	10,409	347	52
Military				
2021	32,191	3,541	118	18
2026	36,909	4,060	135	20
2031	40,408	4,445	148	22
2036	44,168	4,858	162	24
2041	48,206	5,303	177	27
Total Operations				
2021	146,322	16,095	537	80
2026	153,787	16,917	564	85
2031	161,631	17,779	593	89
2036	169,875	18,686	623	93
2041	178,541	19,640	655	98

Source: Jviation, a Woolpert Company, Airport records, ATCT

Peak Hour Enplanements

Peak hour enplanements are determined in a similar way as operations but differ in that they are based on an understanding and application of airline schedules. Hourly flight data was collected from airline schedules for select days in 2019 and 2021. Similar to operations, airline enplanement data show June and July as being the busiest passenger travel months in the year, accommodating approximately 10 percent of all passenger enplanements occurring during each of those summer months.

Applying daily airline schedule data to PMAD enplanements results in peak hour passengers representing 20 percent of the total daily passenger activity, with most typically occurring in the morning (6 am-12 pm). Using those measures, the combined air carrier and air taxi peak hour enplanements were calculated and have been presented in **Table 3-17.** In short, peak hour enplanements are expected to grow from 510 passengers in 2021 to 748 passengers by the year 2041.

Table 3-17: Peak Period Enplanement Projections

Category / Year	Annual Enplanements	Peak Month	Peak Month Average Day	Peak Hour
Air Carrier & Air Taxi				
2021	764,627	76,463	2,549	510
2026	1,055,606	91,076	3,036	607
2031	1,126,028	97,632	3,254	651
2036	1,201,148	104,660	3,489	698
2041	1,281,280	112,195	3,740	748

Source: Jviation, a Woolpert Company, Airport records, airline schedules

Critical Aircraft Determination

The ultimate design and development of airport facilities is directly impacted by the demand for those facilities. Aircraft-related activities (in the form of based aircraft, operational levels, and types of operations) typically serve as the basis for that demand since aircraft tend to generate the most challenging and specific operational requirements. In general, airport infrastructure components are designed to accommodate the most demanding aircraft type that will utilize the infrastructure on a regular basis. The FAA refers to this aircraft type as the Critical Design Aircraft, which it defines as being the most demanding airplane, or family of airplanes, that accounts for at least 500 annual itinerant operations.

This Critical Design Aircraft designation is important since it will serve as the basis of the Airport Reference Code (ARC) and/or Runway Design Code (RDC), which are facility classification systems given to aircraft (and are discussed in detail in the next chapter). The letters associated with the ARC and RDC represent the Aircraft Approach Category (AAC) and range from A through E that represent progressively faster landing airspeeds, with "A" being the slowest. Similarly, the Airplane Design Group (ADG) of the ARC and RDC is reflected by roman numerals that represent aircraft wingspans and tail heights, with "I" being the smallest wingspan and lowest tail height (see **Figure 3-21** below for examples). The FAA utilizes this classification system to apply specific airport design criteria that are appropriate for the operational and physical characteristics of the aircraft types operating at that airport.

To project the current and future Critical Design Aircraft for COS, an itinerant aircraft operations analysis was conducted. As presented in **Table 3-18**, aircraft operations data from the FAA's Traffic Flow Management System Counts (TFMSC) database was used to evaluate historical operations at COS in order to identify an appropriate Critical Design Aircraft. The TFMSC data represents actual flights recorded and validated by the FAA through means of flight plans, instrument flight operations, and/or other radar-based tracking applications. It is the most accurate FAA flight data publicly available and identifies aircraft type, flight dates, flight origins and destinations, among other metrics. (It should be noted that in 2020, there were 1,803 records in the TMFSC data that did not contain ARC and/or ADG categories – they were labeled as "no data.")

Figure 3-21: ARC/RDC Aircraft Examples

Source: FAA

Table 3-18: COS TFMSC Counts (2015-2020)

	2015	2016	2017	2018	2019	2020
ARC/RDC						
A-I	3,197	2,636	2,765	2,953	3,229	2,971
A-II	621	504	518	506	617	669
A-III	0	2	3	5	4	4
B-I	3,068	3,238	2,574	3,076	3,289	3,115
B-II	4,836	4,724	4,900	4,965	5,245	4,637
B-III	943	70	24	33	56	35
B-IV	399	403	330	277	347	302
C-I	792	829	881	855	660	672
C-II	11,388	11,716	10,935	12,904	13,365	7,952
C-III	4,730	6,424	9,400	7,879	7,104	4,188
C-IV	3,195	2,738	2,664	2,434	2,753	1,929
C-V	16	14	37	52	39	30
C-VI	13	50	63	52	40	0
D-I	1,044	1,237	1,292	1,007	782	464
D-II	205	227	184	162	173	104
D-III	2,306	2,303	3,063	3,448	3,352	1,534
D-IV	16	38	23	45	29	18
D-V	79	45	51	52	92	18
TOTAL	**36,848**	**37,198**	**39,707**	**40,705**	**41,176**	**28,642**
Approach Category						
A	3,818	3,142	3,286	3,464	3,850	3,644
B	9,246	8,435	7,828	8,351	8,937	8,089
C	20,134	21,771	23,980	24,176	23,961	14,771
D	3,650	3,850	4,613	4,714	4,428	2,138
TOTAL	**36,848**	**37,198**	**39,707**	**40,705**	**41,176**	**28,642**
Design Group						
I	8,101	7,940	7,512	7,891	7,960	7,222
II	17,050	17,171	16,537	18,537	19,400	13,362
III	7,979	8,799	12,490	11,365	10,516	5,761
IV	3,610	3,179	3,017	2,756	3,129	2,249
V	95	59	88	104	131	48
VI	13	50	63	52	40	0
TOTAL	**36,848**	**37,198**	**39,707**	**40,705**	**41,176**	**28,642**

Source: FAA TFMSC

In reviewing the COS TFMSC data, several observations can be made:

- As expected in 2020, there was an overall decrease in larger regional jets operating at COS. The general trends of activity use by category aligned with previous years. The highest number of operations being experienced at COS is by RDC C-II aircraft, which is reflective of medium and large corporate aircraft as well as regional jets used in commercial air carrier and air taxi service. This has been historically the most predominant aircraft type using the Airport.

- Prior to the pandemic, the Airport was accommodating roughly 28,000 annual approach category C and D aircraft operations, up from approximately

24,000 in 2015. Currently, the D-III (737-800) and C-IV (757-200) designations are the most operationally demanding single ARC types that meet the FAA's 500-annual itinerant operation threshold. This trend is anticipated to continue into future years.

- As it has historically, COS will continue to occasionally accommodate more demanding aircraft than the established Critical Design Aircraft. These can include much larger aircraft such as Boeing 747 and 777 aircraft; however, while these are admittedly more demanding aircraft, they do not operate at a frequency great enough (i.e., 500 annual itinerant operations) to warrant facility design changes at the Airport. Yet when considering the most demanding aircraft type and calculating the annual itinerant operational threshold, the FAA does allow for those more demanding aircraft types to be included in lesser demanding aircraft operational totals as a means of incorporating their occasional use into the overall calculation.

Greater examination of the TFMSC data also shows that aircraft in the D approach category and IV design group, individually, consistently exceed the 500-annual itinerant level threshold. In lieu of identifying a specific critical design aircraft, the FAA also allows for the grouping of aircraft in the most demanding AAC and ADG to represent a composite critical design aircraft. With this methodology, the most demanding AAC that meets the 500-operational threshold is identified as being the representative AAC of the composite design aircraft as is the case with the most demanding ADG. As shown in the preceding table, there were 2,138 operations of Approach Category D aircraft in 2020 at COS, and more than double that in pre-pandemic 2019 (4,428). In 2020 there were 2,249 Design Group IV aircraft operations with significantly more in 2019 as well (3,129).

With respect to identifying a particular aircraft model to serve as the representative of the Airport's Critical Design Aircraft, there is not one D-IV aircraft model that operates frequently enough at COS to meet the 500-annual operation threshold. However, through examination and application of the AAC and ADG components independently, a composite critical design aircraft with an ARC/RDC designation of D-IV is well supported. A common aircraft within this ARC is the Boeing 757, Boeing 767, and MD-11 and will be used as the Airport's existing ARC and RDC.

While historical trends and recent data can provide a good perspective on the current conditions at an airport, the Critical Design Aircraft determination must also consider patterns forecasted to occur within the planning period. When operational growth rates are applied to the FAA TFMSC data for COS, the results continue to show an ARC/RDC of D-IV throughout the 20-year planning period. Operations by larger aircraft operations will continue to increase, but not to a level justifying a higher ARC/RDC.

Summary

It is anticipated that COS will experience moderate growth during the 20-year planning period that generally reflects the regional aviation industry trends and the socioeconomic development growth of the area. Most market demographic trends indicate that the Airport will outpace prevailing national and state growth trends, while other key economic indicators project continued robust growth in the area economy, and by extension, business-related general aviation. Passenger enplanements are projected to grow from approximately 765,000 to over 1,281,000 by 2041, and the Airport will also realize an increase in the number of operations with more than 178,000 operations anticipated by the end of the planning period. Aircraft operations above that level could be experienced in future years should additional aviation businesses and airlines locate to the Airport. Based aircraft are expected to increase from 227 to 378 by 2041, which includes a continued shift in the fleet mix towards business aviation aircraft. **Table 3-19** summarizes the projections for the preferred forecast contained in this chapter.

As recognized previously, to secure FAA approval for the activity projections, FAA requires a comparison of the forecasts to the annually produced TAF. Specifically, the FAA looks at an airport's recommended passenger enplanements, based aircraft, and operations forecasts be within 10 percent of their five-year TAF and within 15 percent of their 10-year TAF. A comparison between the forecasts (included in the table below) shows that the preferred projections all lie within the FAA tolerances.

Table 3-19: Summary of Preferred Aviation Activity Forecasts

	2021	2026	2031	2036	2041
Enplanements					
Peak Hour	510	607	651	698	748
Annual	**764,627**	**1,055,606**	**1,126,028**	**1,201,148**	**1,281,280**
TAF	562,789	964,015	1,034,958	1,104,349	1,168,161
TAF Variance	35.9%	9.5%	8.8%	8.8%	9.7%
Cargo					
Landed Weight (lbs.)	**104,047,500**	**110,988,729**	**118,393,021**	**126,291,270**	**134,716,427**
Operations					
Category					
Air Carrier	13,169	16,917	19,396	22,084	24,996
Air Taxi	14,632	13,841	12,930	11,891	10,712
General Aviation	86,330	86,121	88,897	91,733	94,627
Military	32,191	36,909	40,408	44,168	48,206
TOTAL	**146,322**	**153,787**	**161,631**	**169,875**	**178,541**
TAF	132,911	140,905	144,701	148,532	152,311
TAF Variance	10.1%	9.1%	11.7%	14.4%	17.2%
Local vs. Itinerant					
Local Operations	39,507	41,522	43,640	45,866	48,206
Itinerant Operations	106,815	112,265	117,991	124,009	130,335
Peak Hour	**80**	**85**	**89**	**93**	**98**
Based Aircraft					
Type					
Single Engine	154	164	167	175	189
Multi-Engine	35	32	39	44	42
Jet/Turboprop	22	34	48	60	72
Helicopter	2	6	7	10	15
Glider/Other	2	2	2	3	4
Military	12	26	36	44	57
TOTAL	**227**	**265**	**298**	**336**	**378**
TAF	263	293	323	353	383
Variance	-13.7%	-9.6%	-7.6%	-4.8%	-1.3%

Source: Jviation, a Woolpert Company

4. Demand/Capacity and Facility Requirements

Demand/Capacity Analysis - Introduction

This Airport Master Plan's demand/capacity analyses are based on Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*, and are presented in the following:

- Airfield Capacity Analysis -includes an analysis of the primary aircraft operations area that examines airside facilities (including runways and taxiways) to determine, based on their configuration and other applicable factors, their ability to efficiently process existing and future aircraft operations with acceptable levels of delay.
- Landside Capacity Analysis – includes an analysis of the passenger terminal, general aviation facilities, and automobile parking facilities and their ability to meet existing and future demands.

The findings of these demand/capacity analyses are used later in this chapter to identify future facility development requirements for COS throughout the 20-year planning period.

Airfield Capacity Analysis

The potential implications of future activity levels on airfield capacity, congestion, and delay are important considerations in identifying future facility development plans at COS. Airfield capacity is defined as the maximum number of aircraft operations that an airfield configuration can accommodate during a specified interval of time when there is continuous demand for service (i.e., an aircraft is always waiting to depart or land). This is referred to as the airfield's ultimate capacity or the maximum throughput rate. In layman's terms, this refers to how many aircraft operations a particular airport can accommodate before delays in taking off or landing becomes problematic or unreasonable. The methodology used in this Airport Master Plan focuses on the Annual Service Volume (ASV), a term commonly used by FAA as a quantifiable measure of an airport's annual operating capacity as well as its hourly capacity. The calculation and analysis of ASV is an important tool in the short- and long-range planning process.

Specifically, this section assesses COS's ability to accommodate existing and future demand for aviation activity in the following categories:

- Airfield Layout and Configuration
- Weather Conditions
- Runway Usage

- Aircraft Fleet Mix
- Touch-and-Go Operations
- Peak Hour Activity
- Airfield Capacity Model

These factors have been examined in the following sections as well as their potential to influence the Airport's existing and future operational capacity. Of particular interest is the last section that contains an assessment of COS's airfield capacity based on an FAA methodology. This considers several of the noted factors for the purpose of comparing the Airport's airfield capacity with the projected future operational levels identified in Chapter Three, *Aviation Activity Forecast*, to determine if any potential capacity shortfalls may exist today or in the future.

Airfield Layout and Configuration

A primary factor for determining the operational capacity of an airport's airfield lies in the layout and geometry of its runways and taxiways. The identification of this layout will contribute to the determination of COS's overall airfield capacity, discussed in a later section. COS currently operates a parallel runway system with an additional crosswind runway. The Airport's parallel runways, Runway 17L-35R and Runway 17R-35L, are, at 13,501 and 11,022 feet long respectively, while the crosswind runway, Runway 13-31, is 8,269 feet long. All three runways are 150 feet wide. The centerline-to-centerline separation of the parallel runways is approximately 8,600 feet. Note that Runway 13-31 does not physically intersect either of the parallel runways, although the Runway Safety Area (RSA) for Runway 13 overlaps that of Runway 17R-35L, creating a coupled runway configuration and is identified by the FAA as a Hot Spot. Further, flight paths to/from the crosswind runway intersect flight paths of aircraft on the parallel runways, creating an operational dependency of one runway on the another. The impacts that the COS's current runway configuration and runway separation have on its operational capacity are also dependent on other factors such as operational fleet mix and weather conditions, both of which are addressed below.

COS's three runways are each served by full-length, parallel taxiways. Taxiways and their exits also have an impact on the operating capacity of an airfield in that runways served by an adequate taxiway system with appropriately spaced exits minimize the time an aircraft spends on its associated runway. When aircraft can efficiently exit an active runway, it enables that runway to process another aircraft operation, thereby minimizing or eliminating any possible delay. The taxiway system at COS is illustrated in **Figure 4-1**.

In addition to the parallel taxiways, numerous connector taxiways support all three of COS's runways. As shown in **Figure 4-1**, Taxiways A and C are the full-length parallel taxiways supporting Runway 17R-35L. Access between Runway 17R-35L and Taxiway A is provided by five right-angled exit taxiways (A2, A3, A4, and A7) and two acute-angled, or high-speed, exit taxiways (A1 and A5). Access between Runway 17R-35L and Taxiway C is provided by four right-angled exit

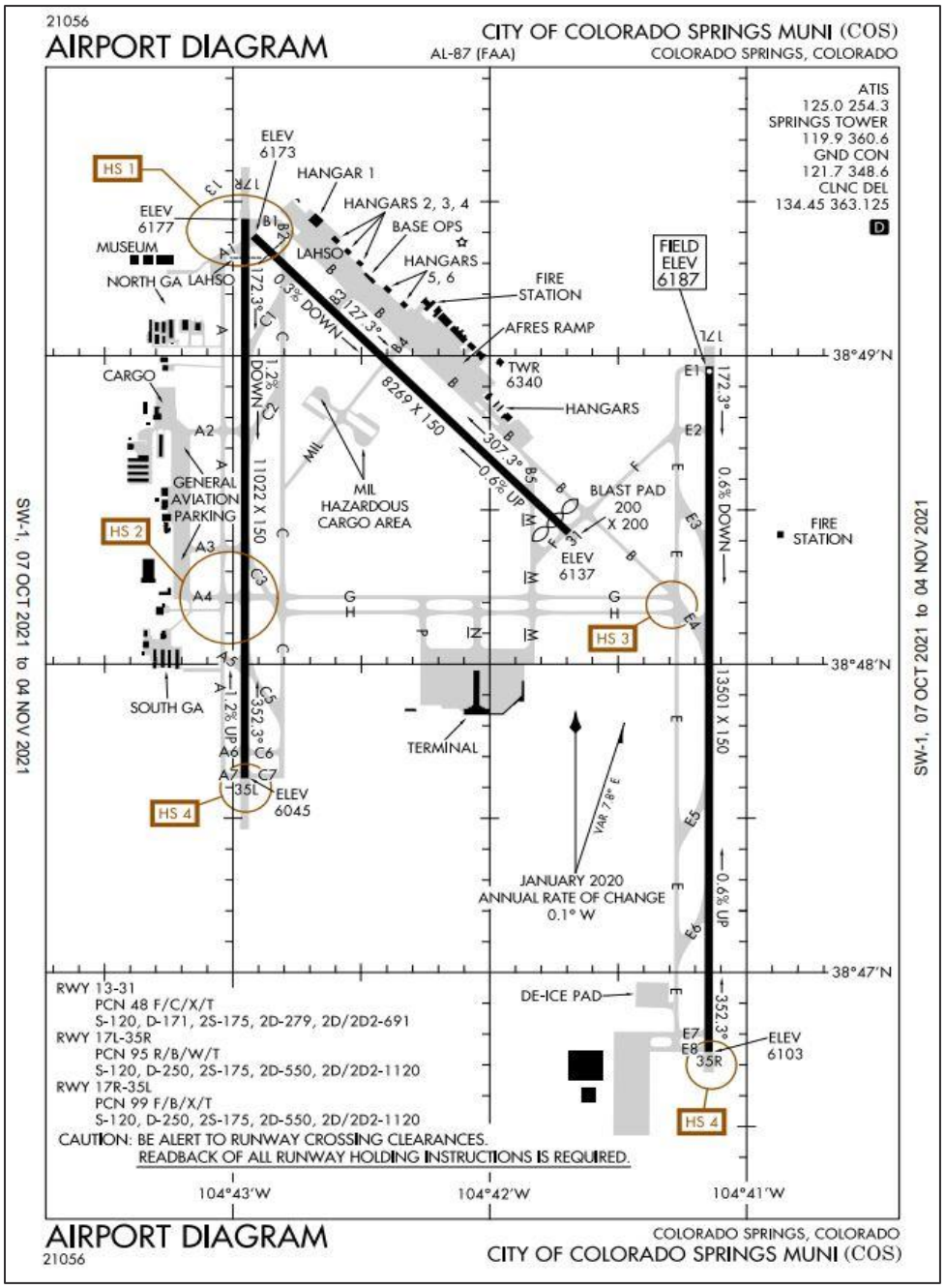
taxiways (B1, G, C6, and C7) and four acute-angled exit taxiways (C1, C2, C3, and C5). Connector Taxiways G and H provide access between Taxiway C and the passenger terminal apron area. Connector Taxiways A2, A3, and A4 provide access between Taxiway A and the general aviation apron area.

Aircraft operations on Runway 17L-35R are supported by full-length, parallel Taxiway E. Four right-angled taxiways (E1, E2, E7, and E8) and four acute-angled taxiways (E3, E4, E5, and E6) support aircraft movement between the runway and the taxiway. In addition, taxiways (B, F, G, H, and M) extend beyond Taxiway E and provide access between Runway 17L-35R, Taxiway E, and the commercial passenger terminal area.

Crosswind Runway 13-31 is served by full-length, parallel Taxiway B, which runs adjacent to the apron serving Peterson Space Force Base (PSFB). Four right-angled taxiways (B1, B3, B4, and F) and two acute-angled taxiways (B2 and B5) support aircraft movement between Runway 13-31 and Taxiway B. Additionally, other taxiways (C, MIL, and M) extend beyond Runway 13-31 and provide access to other areas of the airfield. PSFB facilities on the north side of the airfield are supported by Taxiway B and associated exit taxiways from Runway 13-31.

For the purposes of this demand/capacity analysis, the number and location of the exit taxiways is an important consideration since having enough adequately separated exit taxiways reduces the occupancy time of an arriving aircraft on the active runway thereby increasing that runway's capacity. An input in the FAA's methodology for examining airfield capacity is the number of taxiway exits (separated by at least 750 feet) available on the runway(s) within a prescribed range of the runway threshold. This range is based on the mix index of the aircraft that use the runway. For the purposes of determining the estimated airfield capacity at COS, all runways were credited with having at least four exit taxiways, meeting the FAA demand/capacity criteria. (Note that later sections of this chapter examine how the taxiway system may be enhanced to meet FAA taxiway design standards and considerations.)

Figure 4-1: Airport Diagram



Source: FAA

Weather Conditions

Weather conditions can impact airfield capacity by either slowing down the pace of aircraft operations, or even closing the airport itself. As related to aviation, weather conditions are divided into three categories: visual meteorological conditions (VMC), instrument meteorological conditions (IMC), and low instrument meteorological conditions (LIMC).

Different rules govern the operation of aircraft during each of these conditions. Visual Flight Rules (VFR) are applicable during VMC, which is when weather conditions are such that aircraft can maintain safe operations by visual means. VMC are classified as those times when the cloud ceiling is 1,000 feet or more above the airport elevation and visibility is at least three statute miles. Instrument Flight Rules (IFR) apply during IMC, when cloud ceiling height or sight distance visibility falls below the minimum prescribed for VFR operations. During periods of LIMC, navigation is primarily dependent on aircraft instruments. Low Instrument Flight Rules (LIFR) conditions apply during VMC and when the ceiling is lower than 500 feet or sight distance visibility falls below one mile.

The distinction between IFR and VFR operations is important because the separation distance required by the FAA between aircraft conducting IFR operations is greater than that required during VFR operations. Consequently, fewer aircraft operations can occur during IMC than during VMC. Based on historic climatic conditions at COS, the following assumptions have been identified for use in this demand/capacity analysis:

- VFR conditions occur at COS approximately 87.2 percent of the time
- IFR conditions occur at COS approximately 8.1 percent of the time
- LIFR conditions occur at COS approximately 4.7 percent of the time

The effect that these different meteorological conditions have on aircraft operations at COS is an important factor in determining the Airport's estimated capacity. Calculations shown in a following section of this chapter identify the Airport's hourly capacity in meteorological conditions and utilizes that data as input in the process of quantifying COS's estimated total annual capacity.

Runway Usage

Runway usage relates to the way in which an airfield is operated and takes into account the number, location, and orientation of an airport's active runways, whether those runways are operated simultaneously, and whether they primarily support arrivals, departures, or both. A single airfield layout can have numerous operating configurations given different traffic flows, weather conditions, and activity levels. An understanding of runway usage characteristics at COS is necessary for examining the ability of the existing airfield to efficiently accommodate existing and projected future activity levels.

To maximize its operational capacity, all of COS's runways are used whenever possible. Note that operational requirements warrant aircraft to land and takeoff in the direction having the greatest headwind possible. Due to this, prevailing wind conditions typically dictate the flow of air traffic and runways utilized. For COS, the overall runway-use patterns, based on FAA flight track data, have been modeled and presented below in **Table 4-1**.

Table 4-1: Overall COS Runway Use

Runway	Percent Use
North Flow	
35L	18%
35R	18%
31	4%
Total	**40%**
South Flow	
17R	29%
17L	26%
13	5%
Total	**60%**

Source: FAA Data

The previous table notes that COS's typical direction or flow of operations is to the south 60 percent of the time, with the remaining 40 percent of the time being to the north (or north flow). During south flow conditions, arrivals and departures occur on Runway 17R and Runway 17L with 29 and 26 percent utilization respectively. In north flow, traffic is distributed equally between the two parallel runways. Finally, each end of Runway 13-31 experiences five percent or less of overall operations.

To better understand how specific categories of aircraft use each runway at COS,

Table 4-2 and **Table 4-3** provide a summary of departure and arrival runway utilization by aircraft category for daytime and nighttime operations.

Table 4-2: Runway Use by Aircraft Category - Departures

	Runway							
	Daytime							
	North Flow				South Flow			
Category	35L	35R	31	Total	17R	17L	13	Total
Air Carrier	6%	33%	<1%	39%	6%	55%	<1%	61%
Air Taxi	10%	31%	1%	42%	16%	41%	1%	58%
General Aviation	29%	2%	9%	40%	44%	3%	13%	60%
Military	13%	8%	9%	30%	44%	17%	9%	70%
	Nighttime							
	North Flow				South Flow			
Category	35L	35R	31	Total	17R	17L	13	Total
Air Carrier	13%	60%	<1%	73%	4%	23%	<1%	27%
Air Taxi	11%	65%	1%	77%	3%	20%	<1%	23%
General Aviation	64%	1%	12%	77%	20%	1%	3%	23%
Military	24%	33%	5%	62%	10%	26%	2%	38%

Source: FAA Data

Table 4-3: Runway Use by Aircraft Category - Arrivals

	Runway							
	Daytime							
	North Flow				South Flow			
Category	35L	35R	31	Total	17R	17L	13	Total
Air Carrier	5%	33%	<1%	38%	7%	55%	<1%	62%
Air Taxi	10%	28%	1%	39%	20%	41%	<1%	61%
General Aviation	25%	3%	4%	32%	53%	9%	6%	68%
Military	15%	11%	5%	31%	28%	34%	7%	69%
	Nighttime							
	North Flow				South Flow			
Category	35L	35R	31	Total	17R	17L	13	Total
Air Carrier	26%	42%	1%	70%	6%	24%	<1%	30%
Air Taxi	6%	53%	1%	61%	8%	31%	<1%	39%
General Aviation	58%	6%	10%	74%	18%	5%	3%	26%
Military	39%	34%	3%	77%	5%	14%	4%	23%

Source: FAA Data

In reviewing the data presented above, several important facts about COS runway utilization can be gleaned:

- Daytime operations are predominantly south flow, while nighttime operations are largely north flow.
- The largest percent of Air Carrier and Air Taxi operations occur on Runway 17L-35R; this is likely the result of that runway being the longest on the Airport.
- General aviation aircraft primarily use Runway 17R-35L; this is likely due to its proximity to the Airport's general aviation facilities in addition to general aviation aircraft typically being less sensitive to differences in longer runway lengths.
- Military and general aviation aircraft are the primary users of Runway 13-31; this is likely due to its due to its proximity to military and general aviation facilities, as well as general aviation aircraft typically being more sensitive to prevailing wind conditions. Additionally, it is understood that C-130 military aircraft commonly use Runway 13-31 primarily for training purposes, while larger and/or faster military aircraft will more often use COS's longer runways.

Aircraft Fleet Mix

The aircraft operational fleet mix is an important factor in determining an airport's operational capacity since aircraft following each other on takeoff or landing are spaced according to the differences in their airspeeds. In most instances, as the diversity of aircraft and the range of requisite approach speeds increases, overall operational capacity will tend to decrease as faster aircraft

must make allowances for slower aircraft. Additionally, while all aircraft create wake vortices that must be considered in providing separation between aircraft to help ensure safety, greater separation is required for smaller aircraft following larger aircraft that generate larger vortices. Thus, the larger the difference in size and speed of the aircraft in the fleet, the greater the separation required between aircraft, resulting in a lower operational capacity. For the purposes of calculation, the aircraft fleet is categorized by aircraft weight, and an airport's fleet mix index is determined through application of the following equation:

Airport Fleet Mix Index = % C + 3D

Within this formula, "C" represents a category of aircraft weighing greater than 12,500 pounds but less than 300,000 pounds and "D" indicating those aircraft weighing greater than 300,000 pounds.

The operational fleet mix for COS was developed as part of Chapter Three, *Aviation Activity Forecast*. Pre-pandemic 2019 forecast data was evaluated to determine the percentage of operations conducted by Category C and Category D aircraft. **Table 4-4** presents operations by category of aircraft and determines the Airport Mix Index for COS.

Table 4-4: Airport Fleet Mix Index

FAA Approach Category	Maximum Gross Takeoff Weight (MTOW)	2019 Operations	COS Operational Allocation
A	Less than 12.500 lbs. (Single Engine)	3,850	9.35%
B	Less than 12,500 lbs. (Twin Engine)	8,937	21.70%
C	Between 12,500 and 300,000 lbs.	23,961	58.19%
D	More than 3,000 lbs.	4,428	10.75%
Total		41,176	100%
% C + 3D		**37,245**	**90.45%**

Source: FAA Traffic Flow Management System Count (TFMSC) database

It has been assumed that the future fleet mix at COS will remain consistent with or similar to that experienced in 2019. Note that Category C operations at COS represent all air carrier operations as well as most business class general aviation operations. Any operations conducted by Category D aircraft at the Airport are assumed to be associated Boeing 767 or larger aircraft. Based on the Airport Master Plan's projections of aviation demand and the analysis summarized above, it is estimated that the Airport's Airport Mix Index is 90.45 percent, which may increase slightly over the planning period. This fleet mix percentage is key in estimating the overall airfield capacity later in this chapter.

Touch-and-Go Activity

Touch-and-go operations are defined as operations by a single aircraft that lands and departs on a runway without exiting. Pilots conducting touch-and-go operations usually remain in the airport's traffic pattern as they are generally performing training exercises. Airport capacity increases with the ratio of touch-

and-go operations to total operations primarily since aircraft in a training pattern are continually available for approaches. Touch-and-go operations may, however, reduce the availability of the runway for other types of operations. Based on a review of historical traffic data, it is estimated that touch-and-go operations historically have accounted for approximately 25 to 30 percent of total annual aircraft operations at COS.

Forecasts of aviation activity developed in this Airport Master Plan anticipate that touch-and-go activity will continue to account for between 25 and 30 percent of the Airport's total activity in each year of the 20-year planning period. For demand/capacity planning purposes, the FAA develops ranges for categorizing the percentage of touch-and-go operations occurring at an airport. Based on the projections of aviation demand developed for COS and the ranges identified in FAA AC 150/5060-5, the Airport exceeds the assumed touch-and-go percentages used in the capacity model. To account for this, estimated capacity volumes may have to be adjusted or touch-and-go activity reduced to reduce potential delays during peak periods.

Peak Hour Activity

Peak hour airfield capacity is defined as the maximum number of aircraft operations that can be processed at an airport in an hour. This capacity level varies under VFR and IFR conditions, reflecting the fact that local prevailing wind and weather conditions fluctuate over the course of the year. The peak hour airfield capacity at COS is estimated based on the configuration of the airfield and the operational fleet mix at the Airport. Estimates are determined using a detailed analysis prescribed in FAA AC 150/5060-5 that considers touch-and-go operations and runway/taxiway configuration to produces an estimate of an airport's hourly operational capacity.

Forecasts of aviation activity in this Airport Master Plan result in COS's estimated peak hour operations demand to increase from 80 operations per hour in 2021 to 98 by the year 2041. Note that this peak hour demand is utilized later in this chapter as part of the capacity model.

Airfield Capacity Model

The FAA's long-range planning model for determining airfield capacity is described in FAA AC 150/5060-5. This model combines standardized runway-use configurations with the Airport Fleet Mix Index to determine airport capacity and Annual Service Volume (ASV).

Based on the formula provided on the previous page and the Airport's Fleet Mix (**Table 4-4**) of Group C and D aircraft, the Mix Index is determined to be 90.45 percent. The runway-use configuration that best represents the operations at COS would be dual parallel runways (separated by more than 4,300 feet) with a crosswind runway, as shown below in **Table 4-5**. With an Airport Fleet Mix Index of 81 to 120 percent, the long-range planning ASV for COS is estimated to be 315,000 operations. The hourly capacity under VFR conditions is estimated to be

111 operations per hour, and under IFR conditions, it is estimated to be 105 operations per hour.

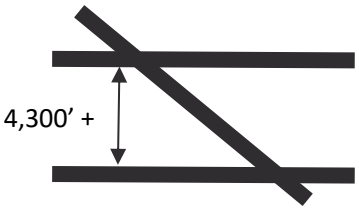


Table 4-5: Runway-Use Configuration and Capacity

Airport Fleet Mix Index % (C+3D)	Hourly Capacity Ops/Hr		Annual Service Volume (ASV)
	VFR	IFR	
0 – 20	197	119	370,000
21 – 50	149	114	320,000
51 – 80	126	111	305,000
81 – 120	**111**	**105**	**315,000**
121 – 180	103	99	370,000

Source: FAA AC 150/5060-5, Airport Capacity and Delay, Figure 2.1

FAA Order 5090.3B, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), indicates that improvements for airfield capacity purposes should begin to be considered once operations reach 60 to 75 percent of the ASV (note that this is an approximate level to begin the detailed planning of capacity improvements). Upon reaching the 80 percent of ASV level, it is recommended that the planned improvements undergo design or construction. **Table 4-6** compares the current (estimated) and projected level of operations at COS against the ASV over the planning period.

Table 4-6: Airfield Demand vs. Capacity

Year	Projected Operations	ASV	Ratio of Annual Demand to ASV
2021	146,322	315,000	46%
2026	153,787	315,000	49%
2031	161,631	315,000	51%
2036	169,875	315,000	54%
2041	178,541	315,000	57%

Source: FAA AC 150/5060-5, Airport Capacity and Delay, Jviation

Based on the forecasted annual operations of 178,541 by 2041, COS's ASV capacity of 315,000 annual operations will not be reached within the planning period. In fact, annual operations are expected to reach only 57 percent of capacity by 2041. When considering peak hour aircraft operations, it is projected that COS will experience a peak of 98 VFR hourly operations by 2041; this too falls short of the IFR and VFR hourly maximum capacities as referenced in **Table 4-5.** Therefore, based on the current and projected operations developed for this Airport Master Plan, improvements specifically designed to enhance airfield capacity are not required for the 20-year planning period. Some improvements, however, may be recommended to enhance the efficiency and accessibility of the airfield.

Landside Capacity Analysis

The demand/capacity analysis conducted for the airfield areas at COS examined the ability of existing airfield facilities to efficiently process existing and anticipated future aircraft operational demands. The following sections present similar analyses conducted for key landside facilities at the Airport. It is important that landside facilities at the Airport be developed in a manner that allows them to not only accommodate current and future demand levels, but also in a manner that promotes the continued synergy between airside and landside facilities.

Demand/capacity analyses are presented for the following COS landside facilities:

- Passenger Terminal
- General Aviation Facilities
- Automobile Parking

Note that the findings of the landside demand/capacity analyses are used later in this chapter to identify the facility requirements and recommended facility improvements that may be necessary to allow them to accommodate anticipated demand through the planning period.

Passenger Terminal

A passenger terminal facility is comprised of multiple subsections; the amalgamation of each of these results in the totality of the terminal's ability to meet demands. The capacity of each element of a terminal facility can vary depending on the acceptable level of crowding and processing time. For example, a passenger traveling on business may be less tolerant of congestion or delay than a passenger traveling for pleasure. In many cases, the degree of acceptability itself may also vary depending on the configuration of the terminal space and the level of amenities provided. Thus, beyond just simple space and throughput modeling, there are elements of a terminal's "capacity" that can be rather subjective, and the preservation of passenger convenience remains an important criterion.

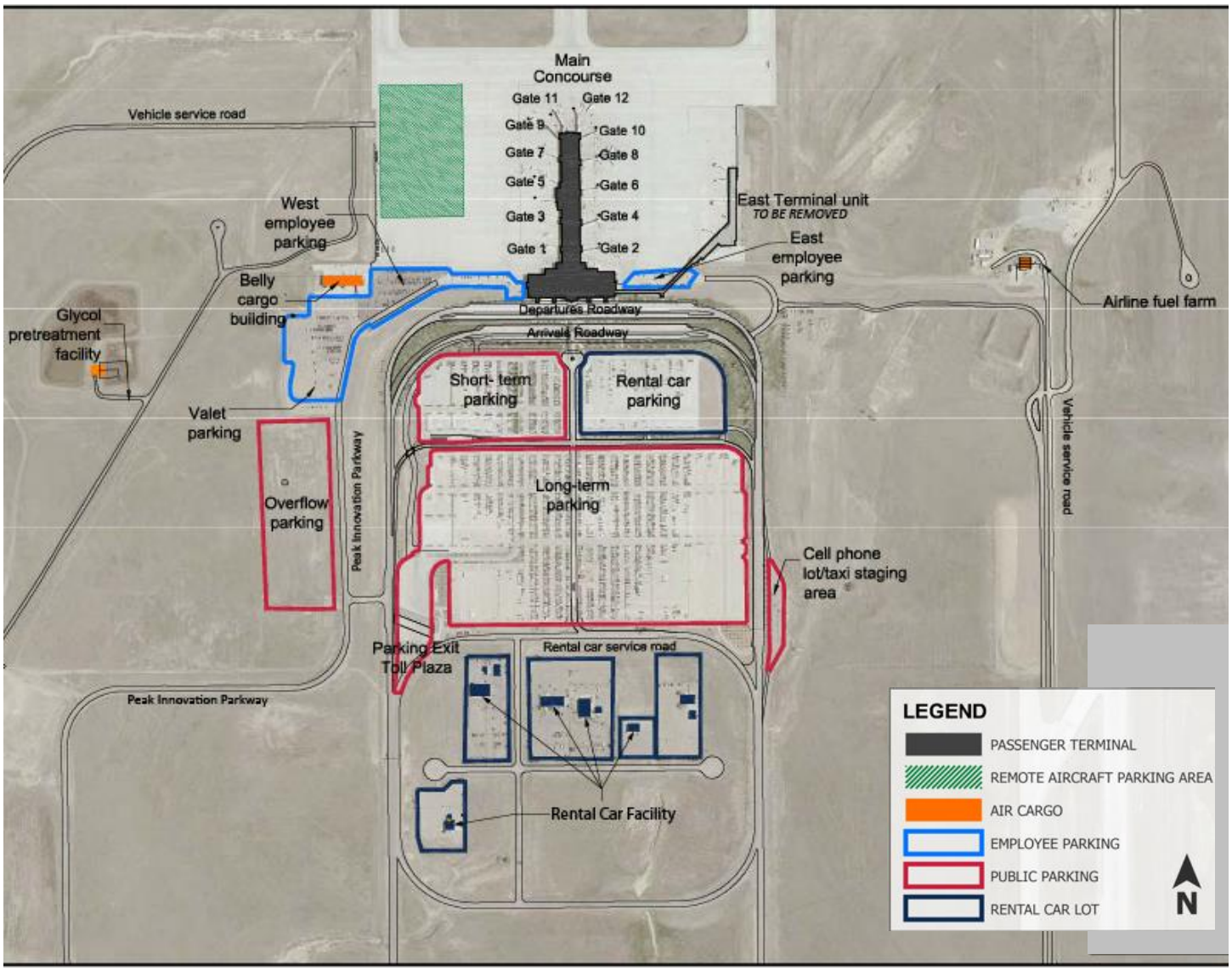
The following areas of the passenger terminal building are evaluated based on a comparison of their existing capacities to demand:

- Aircraft Gates
- Airline Functional Areas
- Concession Space
- Public Space
- Security, Administrative and Other Support Areas

Figure 4-2 shows key functional areas of the COS terminal area. A detailed breakdown of passenger terminal facilities required to meet future air carrier and

passenger demand will be provided in this chapter. This section will focus on determining whether or not existing capacities satisfy current demand as well as identifying parameters to be used in calculating future facility requirements.

Figure 4-2: COS Terminal Area



Source: Airport Records

Aircraft Gates

Aircraft gates are fundamental elements of a commercial terminal building in that they facilitate connecting aircraft with passengers; thus, the number of gates required at a terminal will drive the sizing requirements of many other elements of the overall building. In order to standardize the definition of "gate" and to provide a consistent means for evaluating apron utilization, the Narrow Body Equivalent Gate (NBEG) index has been employed for this analysis. This index

normalizes the gate requirements of a diverse range of aircraft (e.g., small commuters to large aircraft) so they are effectively equivalent to the apron capacity of a typical narrowbody aircraft gate. The amount of space each aircraft requires is based on maximum wingspan. Aircraft are classified according to Aircraft Design Groups as shown in **Table 4-7**.

Table 4-7: Narrow Body Equivalent (NBEG) Index

Aircraft Design Group		Maximum Wingspan	Typical Aircraft	NBEG Index
I	Small Commuter	49’	Metro, Cessna, Pilatus	0.4
II	Medium Commuter	79’	SF340, CRJ, ERJ	0.7
III	Narrowbody	118’	A319, A320, B737, MD80	1.0
IIIa	Large Narrowbody	125’	B757	1.1
IV	Widebody	171’	B767, MD11, DC10	1.4
V	Jumbo	214’	A330, A340, B777, B747	1.8
VI	New Large Aircraft	262’	A380, B747-800	2.2

Source: Jviation
Note: Group IIIa has been added to account for the Boeing 757 which has a wider wingspan than Group III but is smaller than a typical Group IV aircraft.

Aircraft gates at COS are grouped by relative aircraft size as shown below in **Table 4-8**. The aircraft size groupings are based on the maximum aircraft permitted to park at each gate.

Table 4-8: COS Narrow Body Equivalent Gate (NBGE)

Aircraft Design Group	NBEG Index	2021 Gates	NBGE Calculation
Cessna	0.4	0	0
Turboprop	0.4	0	0
Regional Jet	0.7	0	0
Narrowbody	1.0	0	0
Large Narrowbody	1.1	10	11
Widebody	1.4	0	0
Jumbo	1.8	2	3.6
New Large Aircraft	2.2	0	0
Total Gates		12	14.6

Source: Airport Management, Jviation

As shown in **Table 4-8**, gate facilities at COS can accommodate two jumbo or widebody aircraft and 10 large narrowbody aircraft. In terms of NBGE, the main terminal has the equivalent of 14.6 narrowbody gates. All usable gates at COS are equipped with jet bridges designed to accommodate aircraft ranging from large

jets to regional jets. In total, there are 12 usable air carrier gates at the Airport with a total NBEG Index of 14.6.

The FAA maintains an online database that reports daily delays for commercial service airports throughout the country. This database, known as OPSNET, measures aircraft operational delays by:

- Category – departure, arrival and enroute, and traffic management.
- Class – air carrier, air taxi, general aviation, and military; and
- Cause – weather, terminal volume, center volume, equipment, runway, and other.

For purposes of gate demand/capacity evaluation, delays associated with terminal volume in the "Cause" group are the most relevant. At COS for the years 2001 to 2020, the OPSNET database reports that commercial aircraft operating at the Airport experienced no terminal-related delays. This implies that there were no gate-related delays experienced since an inadequate number of gates would have resulted in terminal delays, and possibly requiring additional gate capacity. Therefore, it can be reasonably concluded that existing gates at COS are adequate to accommodate current demand. However, as activity levels continue to increase at the Airport, additional gates may be required in the future; this analysis will be presented later in this chapter.

Airline Function Areas

Areas for airline operations represent the heart of the terminal complex. This section examines key areas typically required and leased by airline tenants to support their operations. Airline functional area characteristics are primary factors in determining the size, configuration, and functional relationship of areas in the passenger terminal. Existing airline functional areas and their ability to meet current demand levels are presented below.

Ticket Counter (area) – The ticket counter area refers to the area occupied by the ticket counters, ticket agents, and the ticket counter baggage belts. Based on the industry standard depth of 10.5 feet and the typical planning factor of 3.6 square feet per peak hour enplaned passenger, the ticket counter area at COS should be approximately 1,800 square feet to accommodate existing passenger demand (COS peak hour passenger enplanement projections have been previously provided in Table 3-17 of Chapter Three, *Aviation Activity Forecast. For 2021, the peak hour enplanement projection was 510)*. The Airport's existing ticket counter area measures approximately 6,700 square feet reflecting an existing utilization factor of 13.1 square feet per peak hour enplaned passenger; this is deemed to be adequate to accommodate existing peak hour demand. In fact, the ticket counter area could reasonably be expected to accommodate additional activity without increases in delay. It is also worth noting that a 3.6 square feet per peak hour enplaned passenger planning factor is common for application to airports like COS and has been used to calculate future ticket counter area requirements.

Ticket Counter (length) – The ticket counter itself is used to facilitate direct passenger to agent/kiosk interaction for the purpose of processing passenger boarding passes and outbound baggage. There are 29 agent ticketing positions currently used for processing passengers and their baggage at COS. In addition, there are 20 self-ticketing kiosks within the ticketing counter area. Eight ticket counters are vacant and not currently leased to airlines. Existing ticket counters at COS have an overall length of 330 linear feet. Like the ticket counter area, ticket counter linear footage currently exceeds the existing peak hour demand requirements and can accommodate additional demand without disproportionate increases in delay or inconveniences to passengers. Using the existing passenger profile and peak hour enplanements, the current space has a planning factor of 0.65 linear feet per peak hour enplaned passenger, where a planning factor of 0.30 feet per peak hour enplaned passenger is the standard at similar airports. This standard will be applied to future COS requirements presented later in this chapter.

Ticket Counter Queuing – This space is comprised of the passenger queuing area directly in front of airline ticket counters. At COS, this area measures approximately 10,000 square feet and includes areas for circulation and self-serve airline ticketing kiosks. Assuming the industry standard depth of 15 feet in front of the ticket counters, an area of approximately 4,950 square feet is needed to meet current demand. This result concludes that there is more than enough space at COS to meet current demand. Future requirements are presented later in this chapter.

Airline Ticket Office – This area is located directly behind the ticket counters and is leased to the airlines as office space. Because this is exclusive space for each airline, the space required in this area is a function of the number of airlines serving COS. Existing office areas measure approximately 8,300 square feet and sufficiently accommodate existing airlines at COS. This assessment has been based on an industry standard depth of 25 feet and a factor of 8.5 square feet per peak hour enplaned passenger used to calculate requirements for airline ticket office space. These standards will be applied to future COS requirements presented later in this chapter.

Departure Lounges – The amount of space required for departure lounges or hold rooms is a function of the number and size of aircraft operating during the peak hour. There are currently 12 aircraft gates within the COS main terminal having approximately 28,319 square feet of area. This exceeds the existing requirement of 21,600 square feet based on the industry standard planning factor of 1,800 square feet per gate; thus, the existing COS departure lounges are currently adequate to meet demands during peak periods. Future requirements are presented later in this chapter.

Baggage Claim Area – This space category represents the area occupied by the baggage claim devices and the queuing area for active bag claiming measures approximately 15 feet out from the devices. At COS, the total baggage claim area measures 15,300 square feet, which results in a ratio of 30 square feet per peak hour deplaning passenger. Based on industry standards, a planning factor of 20

square feet per peak hour deplaned passenger is adequate to meet current peak hour demand. This difference indicates that the existing area is adequate to meet current demand and can accommodate additional future demand. The standard will be applied to future requirements presented later in this chapter.

Baggage Claim Frontage – This area represents the length of the baggage claim devices and is typically designed to accommodate the peak 20 minutes of baggage claim time. There are six baggage claim belts at COS with an estimated total overall length of 600 linear feet. The existing planning factor of 0.45 linear feet per peak hour deplaning passenger is acceptable and will be used to estimate future needs for this space later in this chapter.

Baggage Service – Baggage service offices are leased to the airlines for assisting passengers with lost/stolen baggage issues. COS currently has a total of approximately 1,300 square feet of baggage service office space in the baggage claim area occupied by several air carriers; this is adequate to meet existing needs. Additionally, the ratio of leased area to peak hour deplaned passengers was identified as 2.4, which was deemed to be consistent with industry standards and therefore has also been applied to future requirements later in this chapter. Note that the final allocation of space will largely depend on the needs of airlines and will likely be refined as terminal concepts are developed and airline requirements change.

Outbound Baggage – This area is located directly behind the airline offices and is used for the accumulation, storage, and make up of outbound baggage from the ticket counter areas. The current outbound baggage area at COS measures approximately 11,400 square feet and is inadequate for meeting existing peak hour enplaned passenger demand, based on airline input and oversized baggage requirements. The industry standard of 20 square feet per peak hour enplaned passenger is inadequate for COS standards based on the Airport's higher level of baggage. A level of 30 square feet per peak hour enplaned passenger will be used in future facility requirement calculations later in this chapter. However, continued evaluation should be conducted to maximum available baggage handling space and provide for future solutions.

Inbound Baggage – The inbound baggage area is used to feed bags to the baggage claim devices. There are six baggage delivery belts in the claim area, with each delivery belt measuring approximately 45 linear feet for a total of 270 feet. The existing belts are adequate to meet the existing peak hour demand based on standard industry planning metrics. The existing ratio of 0.53 linear feet per peak hour deplaned passenger has also been used to calculate future inbound baggage belt requirements later in this chapter.

Airline Operations – This space is located on the lower level of the concourse and is used by the airlines for operations, flight coordination, equipment/materials storage, and employee break/meeting areas. At COS, this area measures approximately 20,250 square feet and is adequate to accommodate existing demand. The existing planning factor for this function is estimated at 0.02 square feet per annual enplaned passenger (identified as 1 million that may be achieved

in the short-term), higher than the ration of 0.01 square feet per annual enplaned passenger observed at comparable airports. This standard planning factor will be used to calculate space needed for future demand later in this chapter.

Concession Space

This component of the terminal complex includes those areas dedicated to commercial concessions that generate revenue for the airport. These areas can include food/beverage, news/gift/sundry, rental car, as well as other revenue-generating functions such as advertising. The space in this category provides amenities that serve two vital functions: they provide passengers with desirable services, and they provide revenue to the airport.

Food/Beverage – This area represents the total space for the SSP Stores and Food Court concessions at COS. The existing area occupied by this category totals approximately 12,200 square feet (note this does not subdivide areas into individual shops or pre-security/post-security) and is deemed adequate to meet existing demand. This results in an existing planning factor of 0.012 square feet per annual enplaned passenger (based on 1 million annual enplanements), or slightly lower than the industry standard of 0.02. The future facility space requirements analysis for the concessions area utilizes the industry standard and the results are presented later in this chapter.

Retail – This area includes existing general concession space utilized by Paradies newsstands, gift shops, and other sundry retailers. The existing area used for this function at COS measures approximately 6,250 square feet and does not include 30 square feet of vending space. An additional 1,720 square feet is used for storage space to support these shops. Based on average supply/demand ratios at comparable airports of 0.003 square feet per annual enplaned passenger, this area at COS is deemed to be adequate to meet the current demand. This ratio has also been applied to identify future space requirements later in this chapter.

Rental Car – The rental car area consists of counters and supporting offices for the on-Airport rental car agencies, located near the baggage claim area for the convenience of arriving passengers. The existing area at COS totals approximately 3,120 square feet and is adequate to accommodate the existing demand. Based on comparable airports, a typical planning factor of 0.002 square feet per annual deplaned passenger is anticipated for rental car areas, which is less than the existing COS available space. The standard factor has been used to project future requirements and are presented later in this chapter.

Other Concession Space – This category includes the total area of other concession related space at COS such as additional storage/office space and advertising. This space totals approximately 5,000 square feet (approximately half of which is currently vacant) and is deemed to be adequate to meet the existing demand. Supply/demand ratios observed at comparable airports (0.001 square feet per annual enplaned passenger) have been used to calculate future space needs and are presented later in this chapter.

Public Space

Circulation – This category represents the public circulation area to allow for movement of passengers, visitors, tenants, and employees within the terminal building. It consists of circulation areas in the concourse, in the vicinity of the departure lounges, movement areas within the check-in areas, corridors leading to functional areas, and other public movement areas. In total, COS has approximately 77,775 square feet of public circulation space and based on the summary of planning calculations in **Table 4-9**, it is deemed adequate for current levels of activity. Note that the planning factors indicated below have been also used to determine future circulation space needs and are presented later in this chapter.

Table 4-9: Terminal Circulation Space Demand

Circulation Space	Planning Factor	Current Demand
General	0.06 sq ft per annual enplaned passenger	45,900
Ticketing	2.8 sq ft per peak hour enplaned passenger	1,400
Gate Area	1,600 sq ft per gate	19,200
Other	10 sq ft per peak hour enplaned passenger	5,100
Total		**71,600**
Current Space		**77,775**

Source: Jviation

Restrooms – Restrooms at COS are located both before security (located near the center of the main terminal complex) and beyond security (located in the concourse near the departure lounges). In total, restrooms at the airport total approximately 7,475 square feet which translates to a planning factor of 14.7 square feet per peak hour enplanement; this is deemed to be adequate for current levels of activity. Note that the standard planning factor observed at other airports is 5.0 square feet per peak hour enplaned passenger, which is significantly lower than the existing factor, implying that there is unutilized capacity currently at COS. The standard planning factor has been used to determine future circulation space needs and is presented later in this chapter.

Security, Administrative and Other Support Areas

Security – This area is dedicated for the Transportation Security Administration (TSA) security checkpoints necessary to screen enplaning passengers, inspect outbound baggage through the Airport's Checked Baggage Inspection System (CBIS), and to provide space for TSA employees whose job functions require them to work in the secure public and non-public areas. The overall TSA space at COS measures approximately 28,500 square feet and includes 17,500 square feet of space for CBIS operations, 8,000 square feet for screening, and 3,000 square feet of office space. Included in the screening area is a queuing area in front of the X-

ray devices and magnetometers, areas occupied by the equipment and its operators, as well as a modest area beyond security for passengers to collect their belongings and orient themselves.

The existing security area was allocated to the TSA following the terrorist attacks of September 11th, 2001. COS experiences a throughput of 150 passengers per hour in the standard checkpoint stations and 240 passengers per hour in the pre-check station. Using that rate and applying it to the existing checkpoint configuration, the existing checkpoint should be able to screen 690 passengers per hour. Considering the current peak hour enplanement volume is approximately 510 passengers, the existing checkpoint has enough capacity to support the current demand. This checkpoint screening rate and existing space required for each screening position will also be applied to future enplanements.

Administrative and Other Support Areas - This category of space includes the "back of the house" area that is generally not accessible to the public. It consists of airport administration, airport police, and identification/badging offices as well as areas for utilities and building mechanical functions. Administrative and support area space requirements at an airport can be quantified by assuming that a certain percentage of the terminal building's total area should be reserved to support the administrative function. However, to more accurately reflect the impact that passenger activity levels have on these space requirements, this analysis uses an approach that relates administrative and support space requirements to the annual number of passengers using the terminal.

It is assumed that most of this non-public space at COS is currently considered to be at capacity based on 1 million annual enplanements. This would indicate that the existing factor of square feet per annual enplaned passenger is adequate to accommodate current needs, but that as future activity levels grow additional administrative/support space will likely be needed. The existing ratios of square feet per annual enplaned passenger are used to determine future requirements for each category of space. Space needed for these areas can be re-examined through interviews with appropriate agencies when terminal design is underway.

Airport Administration – Most of this area at COS is located on the third floor of the terminal building and includes approximately 28,700 square feet of space devoted to administration functions. Administrative areas consist of a reception area, offices, break rooms, conference rooms, storage areas, and work areas. Requirements for airport administration are a function of staffing and are generated by COS and the services provided by COS staff. For planning purposes, the future space required in this area is generated for the forecast activity levels based on the existing planning factor for the airport administration area (0.03 square feet per annual enplaned passenger).

Utility/Mechanical – This category includes the support areas for the terminal building and consists of mechanical rooms, electrical rooms, telephone closets, communications rooms, energy control rooms, etc. There is currently a total of approximately 28,000 square feet of utility

and mechanical space in the terminal building. For planning purposes, the required areas for the forecast years are derived based on the existing ratio of 0.03 square feet per annual enplaned passenger.

Passenger Terminal Summary

Identifying potential demand/capacity issues related to the ability of the passenger terminal to effectively process passenger demand is critical to ensure an appropriate level of service for existing and future passengers. The analysis conducted herein has determined that, from an overall perspective, the existing terminal complex adequately accommodates the current demand levels for passengers, airlines, concessions, and other COS needs. This analysis has also demonstrated the methodology and parameters by which future space requirements have been determined and that are presented later in this chapter.

General Aviation Facilities

The ability of general aviation facilities to accommodate existing and anticipated future demand is another important consideration in identifying facility development needs for the Airport. For this analysis, the current capacity of specific COS general aviation facilities has been compared to current demand for them in the following categories:

- Aircraft Storage
- Aircraft Fuel Storage

The findings of the demand/capacity analyses related to the aircraft storage, tiedown positions, and fuel storage facilities will serve as the baseline from which existing and anticipated future facility requirements are identified. A detailed examination of future facility requirements related to general aviation facilities has been conducted and is presented later in this chapter.

Aircraft Storage

Existing general aviation aircraft storage facilities at COS include apron tiedown positions, T-hangars, and conventional hangars, most of which are operated and managed by the Airport's FBOs. There are currently 215 based general aviation aircraft stored in these facilities. It should be recognized that based aircraft numbers can fluctuate at a given airport throughout any year. General aviation aircraft projections were for COS based on the aircraft count that was current during the inventory effort of this study. Since those projections have been approved by the FAA (see Chapter Three), they will not be revised; however, the most current based aircraft data available has been utilized for the following general aviation demand/capacity analysis and the ensuing facility requirements determination. The capacities of each facility type and current demand for each are summarized as follows:

Apron Tiedown Positions – COS has tiedown positions that are used to store based general aviation aircraft as well as to provide temporary storage positions

for transient general aviation and military aircraft within the 580,000 square foot west apron. There are currently over 50 aircraft tiedown positions for based and transient aircraft in that area of which approximately 15 are used for based aircraft and the remaining being available to meet needs for both based and transient aircraft. Based on the current aircraft storage preferences at the Airport, it has been deemed that the existing apron tiedown facilities provide sufficient capacity for existing levels of based aircraft and transient demand. Note that additional apron area may be needed to accommodate expanded services to aircraft as well as movement area to access newly developed areas of the west side of the Airport.

T-Hangars – COS currently has four T-hangar structures (a total of 294,400 square feet) that have can accommodate a total of 175 aircraft with each individual T-hangar unit being capable of accommodating a single aircraft. While they typically store single-engine piston aircraft, smaller, multi-engine piston aircraft can also be accommodated. Currently, the existing COS T-hangar facilities are at capacity, and it is understood that there is a need for additional T-hangars at the Airport.

Conventional Hangars – Conventional or box hangars at COS are used to store general aviation aircraft and are typically operated by the FBO. These can be operated as either as a storage unit for the aircraft of a single owner, or as community storage facilities that may house a multitude of aircraft with different owners. The Airport currently has 14 box hangars (with a total area of 321,200 square feet) that range in size from 10,800 to 100,000 square feet. These storage facilities are at maximum capacity. The FBOs and other airport businesses have indicated that they wish to construct additional conventional hangar storage facilities to meet current and future demand.

Based on the analysis of current based aircraft storage characteristics, it has been established that existing general aviation hangar storage facilities are insufficient to meet current demand. Projected growth in based general aviation aircraft at the Airport will only exacerbate the current deficiency. Facility requirements associated with future hangar needs will be presented later in this chapter.

Aircraft Fuel Storage

COS's primary fuel storage facility (fuel farm) is located between the commercial terminal and Runway 17L-35R. Note that this fuel farm is directly supplied by the NuStar Terminal, and Pipeline facility located in the Airport's east side development area with a pipeline capacity of 20 million barrels per day. This facility provides fuel receiving, storage, and distribution services for the Airport and the region; it has been determined that the facility has adequate capacity to meet existing needs.

The Westside Development Area has separate aircraft fuel storage facilities at FBO tenant sites including Cutter Aviation, LLC; Colorado jetCenter, and the JHW Hangar Complex. There are also aircraft fuel tanks with Jet A and 100LL fuel located in the COS Business Airpark. While these facilities meet their individual existing demand, it is recommended that a consolidated fuel farm be constructed

to distribute aircraft fuel more efficiently to all operators on the west wide of the Airport and add more capacity to meet future demand. Specific expansion needs and potential locations for the development of additional fuel storage facilities have been identified in later sections of this chapter and the Airport Master Plan.

Automobile Parking

The ability of automobile parking facilities at COS to accommodate existing and anticipated future demand is an important consideration in the master planning process. Auto parking facilities support not only the passengers using commercial air carrier service but also those working at the Airport as well as the needs of rental car operators serving Airport customers. A summary of the existing parking facilities at COS and the number of spaces available in each is provided **Table 4-10**.

Table 4-10: Existing Terminal Area Auto Parking Facilities

Location	Function	Spaces
Short-Term Lot	Short-term passenger parking	711 (694 standard, 17 ADA)
Long-Term Lot	Long-term passenger, flight crew parking	3,875 (3,790 standard, 85 ADA)
Overflow Lot	Long-term passenger parking	875 (estimated)
Sub Total	**Passenger parking**	**5,461**
East Manager Lot	Employee parking	40
West Manager Lot	Employee parking	41
West Auxiliary Lot	Employee parking	193
Sub Total	**Employee parking**	**274**
Rental Car Parking	Ready/Return rental cars	768
Cell Phone Lot	Temporary meter/greeter parking	60
Total	**All terminal area parking**	**6,563**

Source: Airport records

Public Parking

As shown in **Table 4-10**, there are approximately 711 short-term and 4,750 long-term public parking spaces at COS. Parking demand is typically determined by applying ratios of spaces required per 1,000 annual enplanements to current and projected enplanement levels at an airport. The ratios used in this analysis for COS assume a demand ratio that uses the busiest parking day in any year (peak month average day + 25 percent) as the design day and assumes a 10 percent cushion to support parking needs even on the busiest days, assuming relatively longer search times for parkers. Because parking demand has historically been growing faster than enplanements at COS, this analysis assumes that the ratio of parking demand to 1,000 enplanements will increase from approximately 3.5 in 2021 to approximately 3.75 in future years.

Based on these assumptions, this analysis indicates that the overall existing public parking spaces are sufficient for current demand. However, through discussions

with airport management, it is understood that the short-term parking lot experiences capacity issues at certain times of the year. This and other anticipated deficits of public parking spaces have been addressed later in this chapter.

Employee Parking

Spaces for employee parking are available in the east and west manager lots as well as the west auxiliary lot. Currently, there are 274 parking spaces allocated for employee parking. Demand for employee parking spaces is typically determined by applying a ratio of demand per 1,000 annual enplanements and assumes a ratio of 0.4 spaces per 1,000 annual passenger enplanements. Based on an annual enplanement level of 1 million passengers, there appears to be a deficiency of employee parking spaces. Based on Airport observations and feedback, however, there is adequate parking to meet current demand. As annual enplanements and the number of employees increase, the demand for employee parking spaces is projected to increase throughout the planning period and will be presented later in this chapter.

Rental Car Ready/Return

The Airport's rental car agencies have a total of 768 ready/return spaces in the lot located directly south of the terminal area. Existing and projected demand for rental car ready/return spaces is typically estimated based on projections of passenger deplanements and a planning ratio of ready/return spaces per 1,000 annual deplanements. Using a ratio of 0.5 spaces per 1,000 annual deplanements at COS, it is estimated that the existing supply of rental car ready/return spaces is adequate to meet the current demand levels. This standard planning factor has been used to determine future rental car parking needs and is presented later in this chapter.

Automobile Parking Summary

The findings of the demand/capacity analysis conducted for parking facilities at COS are further refined and facility requirements for parking facilities are presented later in this chapter. Based on requirements identified for parking facilities at the Airport, the Airport Master Plan will evaluate alternatives for addressing future parking needs. Note that alternatives for meeting future parking needs at the Airport could include reallocating parking spaces from one category to another and constructing additional parking facilities.

Demand/Capacity Summary

Based on aviation activity at COS and the analyses conducted in the preceding sections, the ability of existing Airport facilities to accommodate current demand has been identified. The findings of the demand/capacity analysis for major components of Airport infrastructure can be summarized as follows:

Airfield – The airfield capacity analysis indicates that COS is currently functioning at approximately 46 percent of its capacity or annual service volume. The airfield is expected to reach approximately 57 percent of its operating capacity by 2041. FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, dated December 4, 2000, recommends the initiation of planning for capacity enhancement projects at an airport when the airport reaches between 60 percent and 75 percent of its ASV. Thus, the analysis concluded that the Airport is not projected to reach the 60 percent benchmark within the 20-year planning horizon, and that no action to enhance capacity is warranted.

Passenger Terminal – The demand/capacity analysis conducted for the passenger terminal examined the ability of existing functional areas in the terminal to accommodate current passenger activity levels. The analysis indicated that the existing passenger terminal generally provides sufficient capacity to accommodate current activity. This analysis also demonstrated the methodology and parameters by which future space requirements have been determined later in this chapter.

General Aviation Facilities – The ability of aircraft storage and aircraft fuel storage facilities to accommodate current demand was analyzed based on current based aircraft counts and storage characteristics. Based on the analysis of current based aircraft storage characteristics and existing facilities at COS, it was determined that, with the exception of apron tiedown positions, the capacity of existing general aviation aircraft storage facilities is insufficient to meet current demand levels. Future growth in based general aviation aircraft at the Airport will only amplify the current deficiency.

Aircraft Fuel Storage - The analysis of existing and planned fuel storage facilities at the Airport indicates that they provide sufficient capacity to meet current demand but that future demands may require fuel storage facility expansion. In addition, the potential consolidation of fuel storage tanks could enhance the effectiveness and efficiency of fuel storage and delivery services.

Automobile Parking – The analysis of automobile parking facilities at COS examined the current supply of parking in the following categories: public, employee, and rental car ready/return. By comparing the existing supply of spaces to anticipated demand in each category, it was estimated that a deficiency in short-term and employee parking spaces exists today, which will only worsen as activity increases in future years.

Current and anticipated future facility requirements at COS are identified in the next section of this chapter. Based on the Airport's projections of future aviation demand, the findings of the demand/capacity analyses summarized in this chapter, and other factors, the facility requirements analysis identifies the scope and potential timing of facility improvements needed at the Airport as activity grows.

Facility Requirements - Introduction

Existing and future facility requirements and development standards are identified based on current Airport strategic development initiatives and by comparing the Airport's existing facilities to future facility needs based on forecasts of aviation demand presented in Chapter Three, *Aviation Activity Forecast,* as well as those analyses conducted in the *Demand/Capacity Analysis* sections above. Recommended existing and future facility requirements are presented in the following sections:

- Strategic Development Initiatives
- Airfield Requirements
- Passenger Terminal Requirements
- General Aviation Requirements
- Air Cargo Requirements
- Support Facility Requirements
- Facility Requirements Summary

Note that the FAA provides guidance for planning and design of airport facilities through Advisory Circulars that promote airport safety, economy, efficiency, and longevity. Many of the facility requirements identified for COS incorporate FAA planning and design standards presented in AC 150/5300-13A, *Airport Design*. Chapter Five, *Alternatives Analysis & Development Plan* of this master plan examines alternatives for developing Airport facilities based on the facility requirements and development standards identified for COS in this analysis.

Strategic Development Initiatives

Strategic development initiatives identified in previous studies that are potentially relevant to this Airport Master Plan include the following:

- Airport Master Plan (2013)
- COS General Aviation Area Plan (2016)
- Peak Innovation Park Master Plan (2017)
- PlanCOS – Colorado Springs Comprehensive Plan (2019)
- COS Land Use Study (2019)

These studies are summarized in the following sections. The relevant findings, recommendations, and development plans included in each of these studies and the role that they may play in the current master planning process are also presented.

Airport Master Plan (2013)

COS's previous Airport Master Plan was completed in 2013 and followed a similar process and methodology to the 2022 planning effort. Many of the same factors that impacted the 2013 plan will ultimately be considered in the 2022 plan and may impact the study's future development recommendations. The 2013 plan identified a program for Airport development over a planning period from 2013 to 2033, including short-term, intermediate, and long-term facility development recommendations. Recommendations were based on trends, activity levels, and future activity projections that were present at COS in 2013.

Major development items identified for COS in the previous master plan included the following:

- Decoupling Runway 17R-35L from Runway 13-31 by effectively shifting Runway 17R-35L south and relocating the Runway 13 threshold
- Redevelopment and shifting of Taxiway A to provide a 500-foot separation between Runway 17R-35L and the taxiway
- Expansion of the general aviation apron and additional general aviation hangar facilities
- Construction of an east aircraft deicing pad and snow removal equipment (SRE) storage facility
- Expansion of air cargo and World War II aviation museum facilities
- Enhancements to taxiway connectors

Many of these major development items listed have not been enacted and remain valid. Critical activity thresholds for some of the projects identified in the 2013 plan have not yet been experienced at COS. While the broader, long-term development vision identified for the Airport as part of that plan continues to be valid, elements of that vision may be considered or reconsidered for future facility requirements identified in this Airport Master Plan.

COS General Aviation Area Plan (2016)

With increased interest in its general aviation area (also known as the Westside Development Area), COS developed a General Aviation Area Plan for the westside to provide a longer term plan for use by both the Airport and its potential tenants/developers. An objective of the plan was to analyze potential infrastructure impacts of increased activity. Key elements of this analysis included the following:

- The Westside Development Area's ability to accommodate Very Large Aircraft (VLA), such as the Boeing 747- 8 or the A380
- A master plan of potential development zones, the capacity of those zones, and their potential associated infrastructure impacts
    - Design impacts
    - Topographical impacts (cut and fill)

  - Drainage impacts
  - Utility impacts (not included in this document)
- Cost estimates that provide Capital Improvement Program (CIP) guidance to COS for the Westside Development Area

The Plan was consistent with the 2013 COS Airport Master Plan but provided enhanced detail within the Westside Development Area that allows for implementation of the goals of the Airport. Many of the recommendations of the COS General Aviation Area Plan have been incorporated into this Airport Master Plan.

Peak Innovation Park Master Plan (2017)

A master plan was developed for Peak Innovation Park to identify opportunities for development on the 900 acres of land located south of the COS airfield. The design goals for the Peak Innovation Park Master Plan were to:

- Create a vibrant environment for travelers, companies, employees, and residents
- Strongly integrate airport and business park systems
- Support connectivity with strong regional, local, neighborhood and pedestrian circulation patterns that re-enforce western views
- Create two Mixed-Use Zones connected through amenity streets and green-way patterns and focus amenities on unique user groups

The goals established in the Peak Innovation Park Master Plan are currently being realized through development initiatives by key tenants. The plans and objectives of the Peak Innovation Park Master Plan have been incorporated into this Airport Master Plan.

PlanCOS (2019)

PlanCOS is the physical development plan for the City of Colorado Springs and is intended to be used and referenced as the community grows over the coming decades. In a broad sense, the PlanCOS is intended to establish a vision for land use, infrastructure, transportation, landscaping, and other elements within the community. One of the strategies of PlanCOS is to support a smart growth approach for the Colorado Springs Airport that enables it to maintain its economic value as an air service provider for the City and the region, as well as to strengthen its role as an integrated economic development generator.

PlanCOS focuses on multimodal transportation improvements to/from the Airport to enhance connectivity to various communities throughout Colorado Springs. Elements of PlanCOS have been incorporated into this Airport Master Plan to the extent possible and reasonable, understanding that regional transportation access as it relates to the Airport will also be analyzed within the Airport Master Plan.

COS Land Use Compatibility Study (2019)

To meet the anticipated continued robust growth associated with the City of Colorado Springs and COS, the COS Land Use Compatibility Study analyzed existing and planned land uses on and around the Airport to help ensure that both the Airport and community can continue to grow and develop in a smart and compatible manner. This study also analyzed the ability of the surrounding governmental jurisdictions to implement land use policies, zoning, and building ordinances that balance the current and projected future needs of the Airport with the needs of the community and property owners.

Recommendations from the COS Land Use Compatibility Study will ultimately be presented to the City of Colorado Springs for adoption and integration into ReToolCOS, the City's zoning ordinance update. Recommendations from this Airport Master Plan will be consistent with the COS Land Use Compatibility Study to protect against any future noise, safety, and airspace concerns.

Conclusion: Many aspects of these previous planning efforts will be incorporated into this Airport Master Plan where appropriate.

Airfield Requirements

Airfield facilities are needed at COS to accommodate existing activity levels as well as those projected to be needed through application of applicable FAA standards and various other airfield component requirements. Airfield facilities generally include those that support the transition of aircraft from flight to ground or the movement of aircraft from parking/storage areas to their departure and flight. Note that the planning and design of an airport are primarily based on an airport's role, number of annual and peak hour operations, and the design aircraft that use the facility.

This section of the Airport Master Plan examines the existing layout and design of airfield facilities in order to identify current and future facility requirements. Airfield facility requirements have been developed for the following airfield functional components:

- Critical Design Aircraft and Airport Reference Code (ARC)
- Runway System
- Taxiway System
- Airfield Safety Areas
- Part 77 Surfaces
- Navigational Aids
- Airfield Marking, Lighting, and Signage

Critical Design Aircraft and Airport Reference Code (ARC)

The Critical Design Aircraft is defined by the FAA as the largest aircraft or aircraft family anticipated to utilize an airport on a regular basis. The FAA further defines "regular basis" as those conducting at least 500 annual operations. The Airport Reference Code (ARC) is a coding system used to relate airport design criteria to the operational and physical characteristics of the types of aircraft intended to operate at an airport. Note that the combination of the design aircraft and the ARC serves as the basis for establishing existing and future design standards.

Chapter Three, *Aviation Activity Forecast*, identified the recommended Critical Design Aircraft and ARC for COS to be that of a D-IV. With respect to identifying a particular aircraft model to serve as the representative of the Airport's Critical Design Aircraft, there is not one D-IV aircraft model that operates frequently enough at COS to meet the 500-annual operation threshold. However, through examination and application approach and design components independently, a composite critical design aircraft with an ARC and Runway Design Code (RDC) designation of D-IV was well supported and approved by the FAA. Common aircraft within this ARC include the Boeing 757, Boeing 767, and MD-11. For the purposes of this study, and based on the results of the Forecast, the Boeing 767-400 will serve as the Critical Design Aircraft and will be used as the basis of the existing and future ARC and RDC of D-IV.

The ARC for COS is designated as D-IV. This will serve as an important factor when assessing existing and future facility requirements associated with FAA airport design standards.

Runway System

Runway system facilities required for COS to adequately meet existing and future aviation activity are based on the types and numbers of aircraft projected to use the runway system. Components of the runway system examined in this facility requirements analysis include the following:

- Runway Configuration and Orientation
- Runway Length
- Runway Width
- Runway Pavement Strength

At a minimum, all components of the runway system should be designed and constructed in accordance with the airport design standards developed by the FAA. It should also be noted that while FAA design standards can be exceeded, any costs associated with that exceedance could not be reimbursed by the FAA (i.e., the airport sponsor or other local sources typically would have to fund that portion that exceeds the federal standards). The following sections discuss specific requirements for components of the existing and future runway system at COS.

Runway Configuration and Orientation

As presented in the demand/capacity analysis conducted earlier in this chapter, runway configuration is a primary factor in impacting overall airfield operational capacity. That analysis compared current activity levels and projections of future aviation demand to the existing airside configuration's estimated Annual Service Volume (ASV). The findings of the airfield demand/capacity analysis indicated that COS is projected to experience acceptable ranges of average delay per aircraft operation through the planning period and not reach capacity limits whereby airfield capacity enhancement need to be planned. Thus, based on that analysis, the planning for or construction of any major airfield capacity enhancement projects (i.e., a new runway) is not required during the planning period.

Beyond configuration, runway orientation requirements at COS are determined by comparing the alignments of the runways to the prevailing winds in the Airport-area. The orientation of an airport's runway system to the prevailing wind direction is critical to the safe operation of aircraft and the maximum utilization of the airport facilities. Crosswinds, or winds not parallel to the runway or the path of an aircraft, affect the flight of approaching and departing aircraft, especially light aircraft. During the flight planning process, pilots examine forecasted wind speed and direction at their departure and arrival airports to determine their ability to safely operate at the airports. Proper planning of airport facilities, including runway alignment to prevailing wind conditions, can minimize the frequency with which pilots must deviate from their preferred flight plans as a result of wind conditions.

FAA Advisory Circular 150/5300-13A, states that "the desirable wind coverage for an airport is 95 percent, based on the total numbers of weather observations during the record period, typically 10 consecutive years." Listed in **Table 4-11** are the FAA allowable crosswind component speeds for each RDC. Based on the traffic that typically operates at COS, all four levels of crosswind components (10.5 – 20 knots) must be considered for planning at this Airport.

Table 4-11: Crosswind Components

Airport/Runway Design Code	Allowable Crosswind Component
A-I and B-I (including small aircraft)	10.5 knots
A-II and B-II	13 knots
A-III, B-III, C-I through D-III, D-I through D-III	16 knots
A-IV and B-IV, C-IV through C-VI, D-IV through D-VI	20 knots
E-I through E-VI	20 knots

Source: FAA Advisory Circular 150/5300-13A

Wind data was downloaded directly from the National Climate Data Center (NCDC) from the Automated Surface Observing System (ASOS) located at COS.

The downloaded data contained wind direction and speed for every hour of the past ten complete calendar years (2011 – 2020). Wind coverage percentages for the runway system are provided for VFR, IFR, and All-Weather conditions in **Table 4-12.**

Table 4-12: Wind Coverage

	10.5 Knots	13 Knots	16 Knots	20 Knots
All Weather				
Runways 17L-35R and 17R-35L	91.98%	95.42%	97.90%	99.23%
Runway 13-31	88.92%	93.27%	96.80%	98.86%
All Runways	96.42%	98.12%	99.19%	99.75%
IFR				
Runways 17L-35R and 17R-35L	93.93%	97.10%	99.02%	99.70%
Runway 13-31	93.55%	96.46%	98.64%	99.61%
All Runways	98.36%	99.37%	99.79%	99.92%
VFR				
Runways 17L-35R and 17R-35L	91.77%	95.23%	97.77%	99.17%
Runway 13-31	88.39%	92.91%	96.59%	98.78%
All Runways	96.19%	97.98%	99.12%	99.74%

Source: NCDC, On-Site ASOS

A review of the data indicates that no single runway at COS provides 95 percent coverage for a 10.5 knot crosswind component. Since the two primary runways (17L-35R and 17R-35L) have the same heading, they provide the same level of coverage whether individual or together. Only when the crosswind runway is added to the primary runways does the wind coverage improve to the recommended 95 percent for a 10.5-knot crosswind. Combined, the three runways exceed the recommended 95 percent wind coverage for all three weather conditions.

A heat map is another way to visually interpret the persistency of wind data. As shown in **Figure 4-3**, each column represents 100 percent of the observations of wind in that speed category (such as, 0 to 3 knots or 4 to 6 knots). Blue highlighting represents the least common wind directions, red is the most common, and green is in-between. The heat map visualizes how at lower speeds the wind is directions are well distributed and come from all directions. **Figure 4-3** shows the strongest winds at COS, 22 knots and higher, primarily come from the north.

Figure 4-3: All Weather Wind Heat Map

Wind Direction	Wind Speed (knots) 0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	22+
0 - 10°	4.1%	6.5%	5.0%	4.1%	4.9%	4.7%
10 - 20°	4.1%	5.8%	4.8%	3.0%	3.1%	2.8%
20 - 30°	3.2%	4.1%	4.1%	2.6%	2.2%	1.8%
30 - 40°	3.1%	3.0%	2.3%	2.0%	1.6%	1.4%
40 - 50°	3.2%	2.4%	1.9%	1.9%	1.5%	0.6%
50 - 60°	3.1%	2.5%	2.1%	1.7%	1.0%	1.2%
60 - 70°	3.0%	2.3%	2.2%	1.4%	0.9%	0.3%
70 - 80°	3.1%	2.4%	2.0%	1.2%	0.6%	0.1%
80 - 90°	2.9%	2.6%	2.0%	1.2%	0.5%	0.1%
90 - 100°	3.3%	2.6%	2.0%	1.1%	0.3%	0.3%
100 - 110°	3.0%	2.9%	2.3%	1.2%	0.6%	0.3%
110 - 120°	3.4%	3.1%	2.9%	1.8%	0.6%	0.2%
120 - 130°	3.1%	3.7%	4.5%	3.0%	1.2%	0.6%
130 - 140°	3.2%	4.0%	5.9%	4.9%	2.1%	0.5%
140 - 150°	3.7%	4.9%	7.1%	6.8%	3.6%	0.5%
150 - 160°	2.7%	4.5%	6.8%	8.0%	4.2%	1.1%
160 - 170°	2.1%	3.4%	5.1%	5.9%	4.2%	1.2%
170 - 180°	2.6%	2.9%	3.9%	3.6%	2.8%	1.0%
180 - 190°	2.2%	2.3%	2.8%	2.7%	1.9%	1.4%
190 - 200°	1.9%	1.8%	1.6%	1.8%	2.1%	2.4%
200 - 210°	1.6%	1.3%	1.1%	1.7%	2.8%	4.0%
210 - 220°	1.6%	0.9%	0.8%	1.3%	2.7%	4.3%
220 - 230°	1.3%	0.8%	0.5%	1.0%	1.7%	1.9%
230 - 240°	1.6%	0.8%	0.5%	0.8%	1.3%	1.5%
240 - 250°	1.5%	0.8%	0.5%	0.7%	1.4%	2.3%
250 - 260°	1.7%	0.7%	0.4%	0.7%	1.2%	2.3%
260 - 270°	1.7%	0.9%	0.5%	0.7%	1.1%	2.2%
270 - 280°	2.2%	1.0%	0.6%	0.8%	1.6%	2.3%
280 - 290°	2.2%	1.2%	0.9%	1.3%	2.2%	4.0%
290 - 300°	2.6%	1.8%	1.2%	1.8%	2.8%	5.0%
300 - 310°	2.2%	2.1%	1.9%	2.3%	2.9%	2.4%
310 - 320°	3.1%	2.6%	2.8%	3.6%	4.3%	2.8%
320 - 330°	3.1%	3.2%	4.4%	5.7%	8.2%	9.0%
330 - 340°	4.4%	3.6%	4.4%	6.6%	10.1%	14.5%
340 - 350°	3.8%	4.4%	3.9%	5.8%	8.9%	11.0%
350 - 360°	4.1%	6.1%	4.5%	5.3%	6.9%	8.0%
	100.00%	*100.00%*	*100.00%*	*100.00%*	*100.00%*	*100.00%*

Source: On-Site AWOS

The existing configuration for COS's runway layout provides adequate wind coverage per FAA guidance, no orientation alternatives will be considered for the 20-year planning period. Note that without Runway 13-31, the Airport would not meet the 95 percent wind coverage recommendation.

Runway Length

The purpose of this section is to analyze the Airport's various runway lengths to determine if they are adequate to accommodate the aircraft fleet currently operating and projected to operate at COS, and if not, what those lengths should be. Runway 17R-35L and Runway 17L-35R at COS have lengths of 11,022 feet and 13,501 feet respectively, while Runway 13-31 has a length of 8,269 feet. These current runway lengths allow the Airport to serve a full range of military, air carrier, cargo, and general aviation aircraft. It should be noted that in practical application, specific runway length requirements must be generated for each flight that originates at any airport.

At COS, along with all other airports, these requirements are dependent on a wide range of variables, many of which can vary dramatically daily or even hourly. Nevertheless, the primary factor in determining runway length is the critical design aircraft, which, as previously identified for COS in this Airport Master Plan, is the Boeing 767-400, a civilian air carrier aircraft often used for hauling cargo. With a maximum takeoff weight of 450,000 pounds and wingspan over 170 feet, this is the largest aircraft that frequents the Airport. The largest scheduled air carrier aircraft that regularly operates at COS is the late model Boeing 737. It is anticipated that cargo aircraft (those similar to the 767-400) will continue to represent the largest aircraft regularly using COS.

The method for determining the recommended runway lengths at COS has been based on the characteristics of aircraft included in the Airport's design aircraft (ARC D-IV) family, as well as other large aircraft currently operating at the Airport or anticipated to operate there in the future. In order to determine the ultimate required length of runways, several issues must be considered, including the characteristics of the critical aircraft types that will use the runway, the typical stage length being flown by the critical aircraft, and common atmospheric conditions at the Airport. In general, longer stage lengths require aircraft to carry more fuel thereby increasing the aircraft's weight at takeoff and increasing the runway length required for takeoff. Similarly, warmer air temperatures and the corresponding impacts to air density result in increased runway takeoff length requirements for most aircraft.

FAA Advisory Circular 150/5325-4, *Runway Length Requirements for Airport Design*, and the FAA's Airport Design computer program provide guidance on determining runway length requirements for various classes of aircraft. For this analysis, runway length requirements were examined for a range of aircraft, including the Airport's critical design aircraft as well as specific types of military, air carrier, cargo, and general aviation aircraft that regularly use the Airport.

In determining the required runway length for the Airport, the daily mean maximum temperature of the hottest month (84.8 degrees Fahrenheit) and the Airport's elevation (6,187 feet above mean sea level, or MSL) were applied. In addition, a stage length of approximately 1,600 nautical miles (NM) was used in the analysis to represent a flight from COS to anywhere within the continental US. Flights to Europe, Hawaii and Alaska may were also considered as records

show flights to those destinations from COS have occurred and are within the limits of cargo and military aircraft serving the Airport (note that for European destinations, a stage length of 5,000 NM was used).

Table 4-13: General Runway Length Requirements

Input		
Airport Elevation	6,187' MSL	
Mean Daily Maximum Temp. in Hottest Month	84.8° F	
Maximum Difference in Runway Centerline Elevation	131'	
Estimated Stage Length	1,600 mi / 5,000 mi	
Runway Lengths Recommended for Airport Design		
	1,600 mi	5,000 mi
Small airplanes with approach speeds of less than 30 knots:	490'	490'
Small airplanes with approach speeds of less than 50 knots:	1,290'	1,290'
Small airplanes with less than 10 passenger seats:		
75 percent of these small airplanes:	5,280'	5,280'
95 percent of these small airplanes:	7,450'	7,450'
100 percent of these small airplanes:	7,450'	7,450'
Small airplanes with 10 or more passenger seats:	7,450'	7,450'
Large airplanes of 60,000 pounds or less:		
75 percent of these large airplanes at 60 percent useful load:	8,340'	8,340
75 percent of these large airplanes at 90 percent useful load:	9,910'	9,910'
100 percent of these large airplanes at 60 percent useful load:	12,310'	12,310'
100 percent of these large airplanes at 90 percent useful load:	12,310'	12,310'
Airplanes of more than 60,000 pounds	10,000'	15,000'

Source: FAA Airport Design Software

As previously described, stage lengths of 1,600 and 5,000 miles were used to determine runway length requirements at COS. Using this FAA model, the 13,501-foot length of Runway 17L-35R can appropriately accommodate the Airport's existing and projected aircraft fleet mix. At 11,022 feet, Runway 17R-35L is 1,288 feet deficient in meeting the recommended runway length of 12,310 feet to accommodate all large aircraft. When applying this methodology to Runway 13-31, the need to accommodate smaller aircraft for wind coverage is important. As shown in the table above, a minimum of 7,450 feet would be required to accommodate all small civilian aircraft on Runway 13-31. That said, a number of large airplanes use Runway 13-31 and utilize it full length. For that reason, and for more detailed analyses, aircraft specific runway length requirements should be evaluated further.

In addition to using the FAA model, a review of estimated runway length requirements for common larger aircraft can be beneficial in reviewing runway length requirements. Actual runway length requirements for any aircraft operating at COS can be determined by a wide variety of factors including, but not limited to, air temperature, wind speed, runway condition (dry/wet), aircraft

model, engine types, pilot ability and experience, and operator policies and preferences. The estimated, general runway length requirements presented in **Table 4-14** provide an order-of-magnitude estimate of runway length requirements for relevant aircraft in the air carrier fleet.

Table 4-14: Common Large Aircraft Runway Length Requirements

Aircraft	Maximum Takeoff Weight (lbs.)	Approximate Runway Requirement - 60% Maximum Takeoff Weight	Approximate Runway Requirement - 80% Maximum Takeoff Weight	Approximate Runway Requirement - 100% Maximum Takeoff Weight
C-130	164,000	1,800'	2,600'	4,500'
Airbus A319	169,000	4,000'	5,200'	13,200 *
Airbus A320	172,000	4,500'	6,800	14,700 *
Boeing 737-900	174,200	6,000'	8,200'	14,100' *
Boeing 757-200	255,000	4,800'	8,200'	12,700' *
Boeing 767-400	450,000	6,800'	9,400'	15,700' *
Boeing 747-400	875,000	5,900'	10,000'	16,200' *

Source: Aircraft Manufacturer Planning Manuals
Notes: *Maximum takeoff weight reduced due to airport elevation
Assumptions: Approximate runway length requirements are based on the following inputs:

- Standard day + 27 or 59 degrees F temperature (hot day); C-130 Standard Day
- Zero wind
- Zero runway gradient, wet surface where available

While actual runway length requirements will vary based on a number of factors, the data presented above indicate that a runway length of approximately 13,500 feet is generally sufficient to accommodate each of these aircraft at close to their maximum takeoff weight, on a hot day, and in the other conditions identified. It should be noted that most air carrier operations occurring at COS are conducted by several models of Boeing 737 aircraft, whose runway length requirements are typically less demanding than the general requirements presented in **Table 4-14**. Nevertheless, the current runway length of 13,501 on Runway 17L-35R has been deemed to be adequate for accommodating the current and anticipated future needs of aircraft operating at COS. Additionally, Runway 17R-35L should be extended from its existing 11,022 feet to as close to 12,300 feet as possible. Finally, Runway 13-31 should be maintained as close to its existing length of 8,269 feet as possible to accommodate a reasonable range of small- and medium-sized aircraft, when wind conditions require it.

Runway 17L-35L and Runway 13-31 are currently adequate in length to accommodate most of the aircraft using those runways. Runway 17R-35L should be extended to as close to 12,300 feet as possible.

Runway Width

The required width of a runway is determined essentially by the wingspan dimensions of that runway's critical design aircraft and that runway's approach visibility minimums. Based on its existing and anticipated design aircraft, runway

width requirements at COS have been based on the design standards for Aircraft Design Group IV. **Table 4-15** presents the runway width requirements with the lowest approach visibility minimums for the various Aircraft Design Group categories used in FAA AC 150/5300-13A:

Table 4-15: Runway Width Design Standards

Aircraft Design Group	Wingspan	Runway Width
I	< 49'	100'
II	49' - < 79'	100'
III	79' - < 118'	100'
IV	118' - < 171'	150'
V	171' - < 214'	150'
VI	214' - < 262'	200'

Source: FAA Advisory Circular 150/5300-13A

All runways at COS currently have a width of 150 feet. Based on current runway width design standards of Aircraft Design Group IV, the existing widths of both runways are sufficient to accommodate the Airport's existing and anticipated future design aircraft.

The width of 150 feet should be maintained on all runways.

Runway Pavement Strength

Runway pavement strength represents the load-bearing capacity of the pavement. To ensure safe aircraft operations and minimize pavement damage, it is important that runway pavement strength be sufficient to support the heaviest aircraft expected to use the runway on a regular basis. Runway pavement strength is typically expressed based on common landing gear configurations. A listing of these configurations (and example aircraft) include the following:

Single-wheel – each landing gear unit has a single tire, example aircraft include light general aviation aircraft and some business jet aircraft.

Dual-wheel – each landing gear unit has two tires, example aircraft include the Boeing 737, Boeing 727, MD-80, CRJ 100/200, and the Dash 8.

Dual-tandem – each main landing gear unit has four tires arranged in the shape of a square, example aircraft include the Boeing 757, 767 and the KC-135.

Double dual-tandem – the main landing gear units have the same configuration as the dual-tandem configuration, however, there are twice as many main landing gear units. Boeing 747 aircraft have a double dual-tandem landing gear configuration.

The aircraft gear type and configuration dictates how aircraft weight is distributed to the pavement and determines pavement response to loading. The published pavement strengths of the COS runways are presented in **Table 4-16**.

Table 4-16: Runway Pavement Strength (lbs.)

Landing Gear Configuration	Runway 17L-35R	Runway 17R-35L	Runway 13-31
Single-wheel	120,000	120,000	120,000
Dual-wheel	250,000	250,000	171,000
Dual-tandem	550,000	550,000	279,000
Double dual-tandem	1,120,000	1,120,000	691,000

Source: FAA 5010 Airport Master Record

As shown above, the pavement strength of all runways at COS exceed the maximum takeoff weight of common large aircraft (referenced in **Table 4-14)**. The runways can currently accommodate regular operations by aircraft with maximum weights ranging from 120,000 pounds for aircraft with single-wheel gear configurations up to 1,120,000 pounds for aircraft with double dual-tandem landing gear configurations. While the existing pavement strength of runways at COS are sufficient to meet existing and future demands, on-going maintenance is critical to preserve strength and accommodate aircraft operations.

The pavement strengths of all runways are adequate for the aircraft serving them and should be maintained as such throughout the planning period.

Taxiway System

Taxiway system facility requirements for COS to adequately serve existing and future aviation activity are primarily based on the aircraft projected to use the taxiway system, the 2016 COS General Aviation Area Plan, and the design standards prescribed in the FAA AC 150/5300-13A. Components of the taxiway system examined in this facility requirements analysis include the following:

- Runway/Taxiway Separation Requirements
- Taxiway Dimensional Standards
- Taxiway Efficiency

Specific facility requirement recommendations for these components are identified in the following sections.

Runway/Taxiway Separation

All runways at COS have full length parallel taxiways. Taxiway A supports Runway 17R-35L and has a 400-foot centerline separation with that runway. The runway/taxiway separation between Runway 17L-35R and its parallel taxiway, Taxiway E, is 500 feet. Runway 13-31 is served by Taxiway B and has a centerline separation of over 500 feet. Applicable runway/taxiway separation standards as delineated in FAA AC 150/5300-13A allow for a distance satisfying the requirement that no part of an aircraft (wing tip, tail tip) traveling along a taxiway centerline is within the runway safety area or penetrates the obstacle free zone of the runway. These imaginary runway surface areas are examined and evaluated in a following section of this chapter.

Table 4-17 presents the minimum separation standards considering the aircraft design group and approach visibility minimums that apply to COS.

Table 4-17: Runway/Taxiway Separation Standards
Approach Categories C & D

Runway Centerline to Taxiway Centerline	Airplane Design Group					
	I	II	III	IV	V	VI
Not lower than ¾-mile minimums	300'	300'	400'	**413'**	500'	500'
Lower than ¾-mile minimums	400'	400'	400'	**413'**	500'	550'

Source: FAA Advisory Circular 150/5300-13A
Note: Based on COS Airport elevation

It should be noted that general runway/taxiway separation standards are based on airports located at sea level. FAA AC 150/5300-13A provides adjustments to these values to account for airports located at higher elevations. Specifically for COS, as a Group IV airport, the separation requirement based on clearing the inner-transitional OFZ (discussed later in the chapter) is 413 feet. Additionally, FAA guidance recommends that (ideally) aircraft holding at a runway have adequate separation to hold at a 90-degree angle relative to the runway centerline. With a 312-foot runway centeline to hold line separation requirement (corrected to COS elevation) most aircraft using Runway 17R-35L will hold at a 90-degree angle with a 500-foot runway/taxiway separation. As such, it is recommended that Taxiway A be separated from Runway 17R-35L by an additional 100 feet to achieve that 500-foot separation.

The separation between Taxiway A and Runway 17R-35L should be increased from 400 feet to 500 feet.

Taxiway Dimensional Standards

Taxiway dimensional standards include measurements that account for physical taxiway characteristics as well as safety related areas. The following taxiway-related dimensional standards are important to the design of the taxiway and safety of the aircraft using them:

Taxiway Width - Pavement width of the taxiway is intended to support the weight of the aircraft while taxiing to or from the runway.

Taxiway Shoulder - The taxiway shoulder reduces the possibility of blast erosion and engine ingestion problems associated with jet engines that may overhang the edge of taxiway pavement. Soil with turf not suitable for this purpose requires a stabilized or low-cost paved surface.

Taxiway Safety Area - The taxiway safety area is a defined surface alongside the taxiway suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway. The taxiway safety area must be clear of ruts or humps, graded to provide water run-off, capable of supporting snow and emergency

equipment, and free of objects (objects over 3 inches must be supported on frangible mounts).

Taxiway Object Free Area - The taxiway object free area is an area around the taxiway intended to enhance the safety of aircraft by having the area free of objects, except those objects that need to be located in the area for air navigation or aircraft ground maneuvering purposes.

COS falls under the Taxiway Design Group 5 and Airplane Design Group IV dimensional standards as shown in **Table 4-18**.

Table 4-18: Taxiway Dimensional Standards

Item	Taxiway Design Group							
	1A	1B	2	3	4	5	6	7
Taxiway Width	25'	25'	35'	50'	50'	**75'**	75'	82'
Taxiway Shoulder	10'	10'	15'	20'	20'	**30'**	30'	40'
	Airplane Design Group							
	I	II	III	IV	V	VI		
Taxiway Safety Area Width	49'	79'	118'	171'	214'	262'		
Taxiway Object Free Area Width	89'	131'	186'	259'	320'	386'		

Source: FAA Advisory Circular 150/5300-13A

All the taxiways at COS meet current taxiway dimension standards. All primary taxiways are at least 75 feet wide and have the appropriate safety clearances. In the future, the Taxiway Design Group and Airplane Design Group will remain 5 and IV, respectively, and taxiways will not require dimensional standards beyond what currently exists. Any future taxiway development should be designed to these standards to provide an adequate margin of safety to airfield operations.

The designation of Taxiway Design Group 5 requires a taxiway width of 75 feet. Taxiway safety and object free areas at COS are designated as Airplane Design Group IV as determined by the critical design aircraft. These design standards should be applied and maintained on all taxiways at COS.

Taxiway Efficiency

As discussed above, the taxiway system at COS is adequate and readily configurable to meet current FAA standards. The prime objective would be to realign Taxiway A to provide greater separation from Runway 17R-35L. As far as other changes that are required, the FAA has a variety of taxiway design requirements identified in FAA AC 150/5300-13A that are intended to enhance the overall safety of taxiway operations and minimize opportunities for runway incursions. Many of these requirements are relatively new (circa 2012) and were not in effect when most of COS's pavements were constructed. These design principles for taxiway system layouts are identified in **Table 4-19**.

Table 4-19: FAA Taxiway Design Principles

Design Principle	Summarized Definition
Steering Angle	Design taxiways such that the nose gear steering angles is < 50 degrees
Fillet Design	Traditional fillet design standards have been replaced. New fillet design more effectively reflects aircraft wheel tracks
Standardize Intersection Angles	90-degree turns are standard 30, 45, 60, 90, 120, 135, and 150-degree preferred intersection standard angles
Concepts to Minimize Runway Incursions	
Increase Pilot Situational Awareness	Utilize the "three-node concept". Pilot should have three or fewer choices at an intersection (left, right, straight)
Avoid Wide Expanses of Pavement	Wide pavement requires placing signs far from a pilot's eye
Limit Runway Crossings	Reduces the opportunity for human error
Avoid "High Energy" Intersections	Located in the middle third of the runways. Limit the runway crossings to the outer thirds of the runway
Increase Visibility	Provide right angle intersections for best pilot visibility. Acute angle runway exits should not be used as runway entrance or crossing
Avoid "Dual Purpose" Pavements	Runways used as taxiways and taxiways used as runways can lead to confusion
Indirect Access	Eliminate taxiways leading directly from an apron to a runway
Hot Spots	Limit the number of taxiways intersecting in one spot

Source: FAA Advisory Circular 150/5300-13A

As it relates to taxiway design, COS has two areas of special concern (or "Hot Spots") as identified by the FAA.

- *Hot Spot 2 (HS 2)*: Intersection of Taxiway A4 and Taxiway G at Runway 17R-35L: "High volume" crossing point.
- *Hot Spot 3 (HS 3)*: Large concrete area at the intersection of Taxiway E4, Taxiway G, Taxiway H and Taxiway E. High risk of entering wrong taxiway.

To remedy these Hot Spots, the taxiway configurations in these areas will have to be redeveloped to reduce the number of converging taxiways. Specifically, for HS 2, the direct connection between the General Aviation Apron and Taxiway A will be removed to not only address the high-volume crossing point, but also eliminate the direct apron-to-runway access. For HS 3, to reduce number of multiple taxiways converging in one location, high-speed exit Taxiway E4 will be shifted south, and a short section of Taxiway B will be realigned to create a 90-degree angle with Taxiway E.

Presently at COS, the taxiway system is primarily made up of right and acute angle entrance and exit taxiways to/from the runways. There are several taxiway-

taxiway intersections that may impede the flow of aircraft during peak travel periods; however, there are multiple routes aircraft may take to the terminal area and the GA apron that may be utilized to bypass any congestion that may exist. The following is a list of additional recommended taxiway system enhancements that will reduce the time aircraft spend taxiing to/from the runways and/or intended to meet taxiway design principles.

High-Speed Exit Taxiways – The FAA suggests that when the design peak hour has fewer than 30 operations (takeoffs and landings), a properly located right-angle exit taxiway will achieve an efficient flow of traffic. However, as demonstrated in Chapter Three, *Aviation Activity Forecast*, the design peak hour is currently 80 operations and the projected level of operations in the peak hour will reach approximately 98 operations by the end of the planning period. The Airport has several high-speed exit taxiways serving both parallel runways. To improve their efficiency, adhere to taxiway design principles, and to meet the needs of future runway configurations, several high-speed exit taxiways will be shifted or new high-speed exits installed.

Entrance Taxiways – Air traffic personnel at busy airports encounter occasional bottlenecks when moving aircraft ready for departure to the desired takeoff runway. Bottlenecks result when a preceding aircraft is not ready for takeoff and blocks the access taxiway. Bypass taxiways provide flexibility in runway use by permitting ground maneuvering of steady streams of departing airplanes, resulting in enhanced traffic flow. Primary Runways 17R-35L and 17L-35R should have bypass taxiways installed to improve runway accessibility.

Intersecting Taxiways – Taxiway intersections designed to accommodate cockpit-over-centerline steering require more pavement than other designs but enable more rapid movement of traffic with minimal risk of aircraft excursions from the pavement. The FAA has created new taxiway fillet design standards for intersecting taxiways to improve the flow of aircraft to/from the runways and to reduce the risk of aircraft exiting the taxiway pavement. All taxiway intersections and fillets should be designed to accommodate cockpit-over-centerline steering.

All proposed improvements to the taxiway system are illustrated on the proposed Airport Layout Plan (ALP).

Recommended taxiway modifications include shifting high-speed exit Taxiway E4, realigning a short section of Taxiway B, adding a bypass taxiway to the approach end of Runway 17L, revising the connectors to the approach end of Runway 13, and realigning taxiway connectors and high-speed exits associated with the increase in the Runway 17L-35R and Taxiway A separation.

FAA Airport Design Criteria

This section presents a review of selected FAA airport design criteria as detailed in FAA AC 150/5300-13A. In general, FAA airport design criteria can be designated airfield areas with specified dimensions and requirements that promote the safe movement and operation of aircraft at an airport. Many of these pertain to runways and their immediate surroundings. For this analysis, the selected criteria include the following:

- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Obstacle Free Zone (OFZ)
- Accident Potential Zone (APZ)

Runway Protection Zone

The Runway Protection Zone (RPZ) is trapezoidal in shape and is centered on the extended runway centerline. The function of the RPZ is to enhance the protection of people and property on the ground. The RPZ begins 200 feet beyond the end of the runway pavement that is usable for takeoffs and landings. If runway pavement is used for either takeoffs or landings, the start of the RPZ remains at the 200-foot standard. The actual length and width of the RPZ is contingent on the size of the runway's critical design aircraft, as well as the type of instrument approach available on that runway. Note that in general, as aircraft size increases and the approach minimums decrease, the dimensions of the RPZ increase. **Table 4-20** presents a summary of the RPZ dimensions at COS as well as the acreages for each.

Table 4-20: Runway Protection Zone (RPZ) Dimensions

Approach Visibility Minimums	Dimensions for C&D Category Aircraft				COS Runway Approach Ends
	Length	Inner Width	Outer Width	RPZ Acres	
Visual and not lower than 1-mile	1,700'	500'	1,010	29.465	Rwy 13, 31
Not lower than ¾-mile	1,700'	1,000'	1,510	48.978	Rwy 17R, 35R
Lower than ¾-mile	2,500'	1,000'	1,750'	78.914	Rwy 17L, 35L
Departure RPZ	1,700'	500'	1,010'	29.465	All Runways

Source: FAA Advisory Circular 150/5300-13A

The FAA Memorandum, *Interim Guidance on Land Uses Within a Runway Protection Zone*, indicates that existing incompatible land uses within an RPZ should be removed when those uses would enter the limits of the RPZ as the result of:

- An airfield project (e.g., runway extension, runway shift)
- A change in the critical design aircraft that increases the RPZ dimensions
- A new or revised instrument approach procedure that increases the RPZ dimensions
- A local development proposal in the RPZ (either new or reconfigured)

Although the RPZs for Runways 13 and 17R have incompatible uses, they are existing conditions and not as a result of the actions mentioned above. Without other mitigating circumstances, these conditions are effectively "grandfathered" and allowed to exist until any one of the terms mentioned above are met.

It has been suggested by airport management and discussed in the previous master plan that approach visibility minimums to Runway 35R be lowered to below ¾ mile in the future. Lowering approach visibility minimums to this runway would increase the size of the RPZ to 2,500 feet in length, 1,000 feet in inner width, and 1,750 feet in outer width. There are no conflicting land uses within the future RPZ for Runway 35R.

No action is required regarding the COS RPZs.

Runway Safety Area

The Runway Safety Area (RSA) is a defined surface surrounding the runway that is specifically prepared and suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the paved surface. According to the FAA's definition, the RSA should be cleared and graded and have no potentially hazardous ruts or surface variations. This area should also be drained through grading or by storm sewers and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment and the occasional passage of aircraft without causing structural damage. General requirements for grading of the RSA are 0 to –3-degree grade for the first 200 feet from the runway end, with the remaining longitudinal grade ensuring that no part of the RSA penetrate the approach surface or drop below a –5-degree grade.

At COS, which has an ARC of D-IV for all runways, the RSA is required to be 500 feet wide and extend 1,000 feet beyond the runway end. It should also be noted that when RSAs of two runways intersect, this creates a "coupled" runway condition that results in the runways being dependent on one another and may cause confusion for pilots. In such situations, the FAA aggressively seeks to reduce coupled runway conditions where they can be effectively mitigated.

Hot Spot 1 at COS is such a condition:

> *Hot Spot 1 (HS 1)*: Runway threshold 13 and 17R are next to each other; wrong runway departure and landing potential. Runway 17R connector Taxiway B1; tower line of sight limited. Maintain close communication with ATCT when in this area.

In addition to HS 1, a Modification to Standards (MOS) was filed with the FAA on November 3, 2011, to request deviation from the RSA gradient requirement for Runway 13. Currently, the RSA for Runway 13 exceeds the 0 to –3-degree grade requirement for the first 200 feet from the runway end.

To resolve HS 1 and eliminate the MOS, a shift of Runway 17R was recommended as part of the 2013 Airport Master Plan. That recommendation called for relocating the Runway 17R approach end 1,790 feet to the south and extending the Runway 35L approach end by 2,500 feet also to the south while maintaining RPZ land use requirements. Completing this project would eliminate the HS 1 issue, allow for the opportunity to regrade the RSA for Runway 13, thereby

eliminating the MOS, as well as provide a longer runway as recommended in the previous Runway Length section.

The 2013 Airport Master Plan also recommended a project to relocate the Runway 13 approach end and displace the threshold to clear the associated RPZ and meet RSA standards. Based on review of the existing conditions, standards, and requirements, relocating and displacing the Runway 13 threshold is not required. Without changes in the approach, threshold location or new roads developed in it, the RPZ for Runway 13 meets current and interim RPZ guidance. Further, the current RSA meets clearing standards and does not require a threshold relocation or displacement.

The recommendation from the previous Master Plan cited above will be considered in the study of alternative solutions to address HS 1. Additional options will be developed and evaluated as well, in an effort to provide a comprehensive study of the issue. Alternatives are presented/evaluated and a recommendation provided in the next chapter.

Runway Object Free Area

The runway OFA is a two-dimensional ground area surrounding the runway and centered on the runway centerline. The runway OFA should be cleared of above ground objects protruding above the runway safety area edge elevation. Except where precluded by other clearing standards, it is acceptable to place objects that need to be in the OFA for air navigation or aircraft ground maneuvering purposes and to taxi and hold aircraft in the OFA. Objects non-essential for air navigation or aircraft ground maneuvering purposes are not to be placed in the OFA. For all runways at COS, the OFAs extend 1,000 feet beyond each runway end and have a width of 800 feet.

No action is required regarding the COS ROFAs.

Obstacle Free Zone

The Obstacle Free Zone (OFZ) is a volume of airspace intended to protect aircraft in the early and final stages of flight. OFZ clearance standards prohibit taxiing and parked airplanes and other objects, except frangible NAVAIDs or fixed-function objects, from penetrating this zone. At COS, the OFZs associated with all runways have a width of 400 feet and extend 200 feet beyond each end of the runway. In addition, because of existing approach lighting systems and precision instrument approaches to the approach ends of Runway 17L and 35L, inner approach OFZ, inner-transitional OFZ, and precision OFZ requirements apply.

The inner-approach OFZ is a defined volume of airspace centered on runways with approach lighting systems. The inner-approach OFZ begins 200 feet from the runway threshold, at the same elevation as the runway threshold, and extends 200 feet beyond the last unit in the approach lighting system. It is the same width as the OFZ and rises at a slope of 50 to 1 away from the runway end.

The inner-transitional OFZ is a defined volume of airspace along the sides of the runway and the inner-approach OFZ and applies only to runways having precision instrument approaches with visibility minimums of lower than 3/4-statute mile. In addition, separate inner-transitional OFZ criteria apply to Category I and Category II/III precision instrument approach runways.

For runways having a Category II precision approach, such as Runways 17L and 35L at COS, the inner-transitional OFZ begins at the edges of the runway OFZ and inner-approach OFZ, then rises vertically for a height "H", and then extends at a slope of 5:1 out to a distance "Y" from runway centerline, and then slopes 6:1 out to a height of 150 feet above the established airport elevation. For these runways, "H" and "Y" are calculated using the following equation where "S" is the wingspan of the most demanding aircraft using the airport and "E" is the runway threshold elevation above sea level:

Table 4-21: Runway 17L & 35L Inner-Transitional OFZ

Runway 17L	Runway 35L
$H_{feet} = 53 - 0.13(S_{feet}) - 0.0022(E_{feet})$, where	$H_{feet} = 53 - 0.13(S_{feet}) - 0.0022(E_{feet})$, where
$H_{feet} = 53 - 0.13(125) - 0.0022(6,187)$, and	$H_{feet} = 53 - 0.13(125) - 0.0022(6,145)$, and
$H_{feet} = 23.1$ feet	$H_{feet} = 23.2$ feet
$Y_{feet} = 440 + 1.08(S_{feet}) - 0.024(E_{feet})$, where	$Y_{feet} = 440 + 1.08(S_{feet}) - 0.024(E_{feet})$, where
$Y_{feet} = 440 + 1.08(125) - 0.024(6,187)$, and	$Y_{feet} = 440 + 1.08(125) - 0.024(6,145)$, and
$Y_{feet} = 426.5$ feet	$Y_{feet} = 427.5$ feet

Source: FAA Advisory Circular 150/5300-13A

Based on these calculations, the recommended 500-foot runway/taxiway separation will allow for the clearance of the 767-400 aircraft tail while taxiing on the full-length taxiways serving the parallel runways at COS. The design of future runway end elevations should consider this calculation to clear potential aircraft using the parallel taxiway.

The precision obstacle free zone (POFZ) is defined as a volume of airspace above an area beginning at the runway threshold, at the threshold elevation, and centered on the extended runway centerline, 200 feet long by 800 feet wide. The POFZ surface and its requirements are only in effect when all of the following operational conditions are met:

- Vertically guided approach
- Ceiling below 250 feet and/or visibility less than ¾ statute mile
- Aircraft on final approach within two miles of the runway threshold

Based on these factors, POFZ requirements are only currently applicable to the approach ends of Runways 17L and 35L but could be applicable to future runways ends as approach minimums are lowered. When the POFZ is in effect, a wing of an aircraft holding on a taxiway waiting for runway clearance may penetrate the POFZ; however, neither the fuselage nor the tail may infringe on the POFZ.

Based on these requirements and review of the existing holdline locations at COS, POFZ requirements are currently being met. Future runway/taxiway configurations should avoid taxiing aircraft into the POFZ at inappropriate times while arriving aircraft are on approach.

No action is required regarding OFZs for all runways at COS. This includes POFZ requirements for precision approach runways.

Accident Potential Zones (APZs)

Although they are not standards or criteria applied by the FAA, APZs are in place at COS as a result of the operations performed by PSFB. Below is a description of the two types of APZs in place at COS.

- Accident Potential Subzone (APZ – 1): The APZ-1 is an area located immediately beyond the runway protection zone (or clear zone) and possess a higher potential for aircraft accidents. The City of Colorado Springs restricts ground level development up to the maximum height of the base zone in these areas. This zone is not recognized by the FAA but is by the military standards.

- Accident Potential Subzone (APZ – 2): The APZ-2 is an area beyond the APZ-1 that has a measurable potential for accidents. The City of Colorado Springs restricts ground level development up to the maximum height of the base zoning district. This zone is not recognized by the FAA but is by the military standards.

No action is required regarding the COS APZs. Future development should preserve and protect the APZs.

Airspace Surfaces

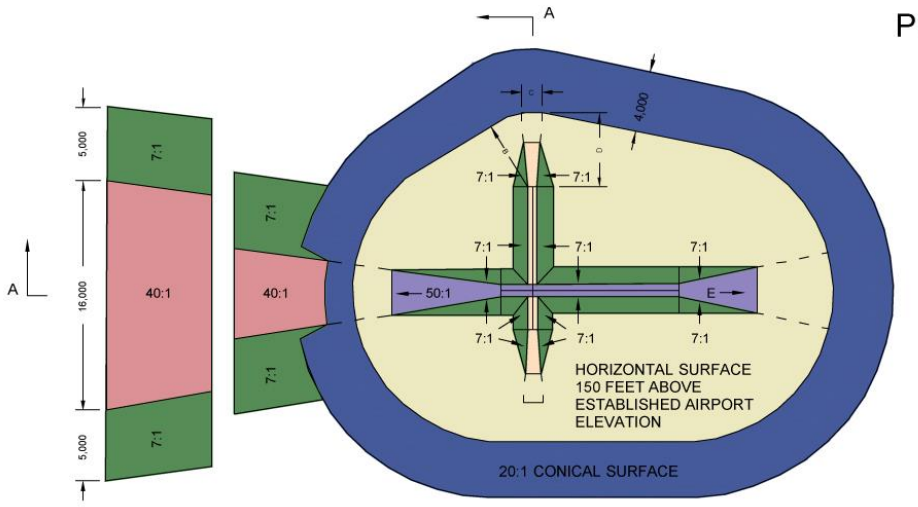
Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*, establishes standards for determining which structures pose potential obstructions to air navigation. Airspace areas around an airport that cannot contain any protruding objects are referred to as "Imaginary Surfaces." Objects affected include existing or proposed objects of natural growth; terrain; or permanent or temporary construction, including equipment, which is permanent or temporary in character.

The imaginary surfaces outlined in FAR Part 77 consist of the following:

- Primary surface
- Transitional surface
- Horizontal surface
- Conical surface
- Approach surface

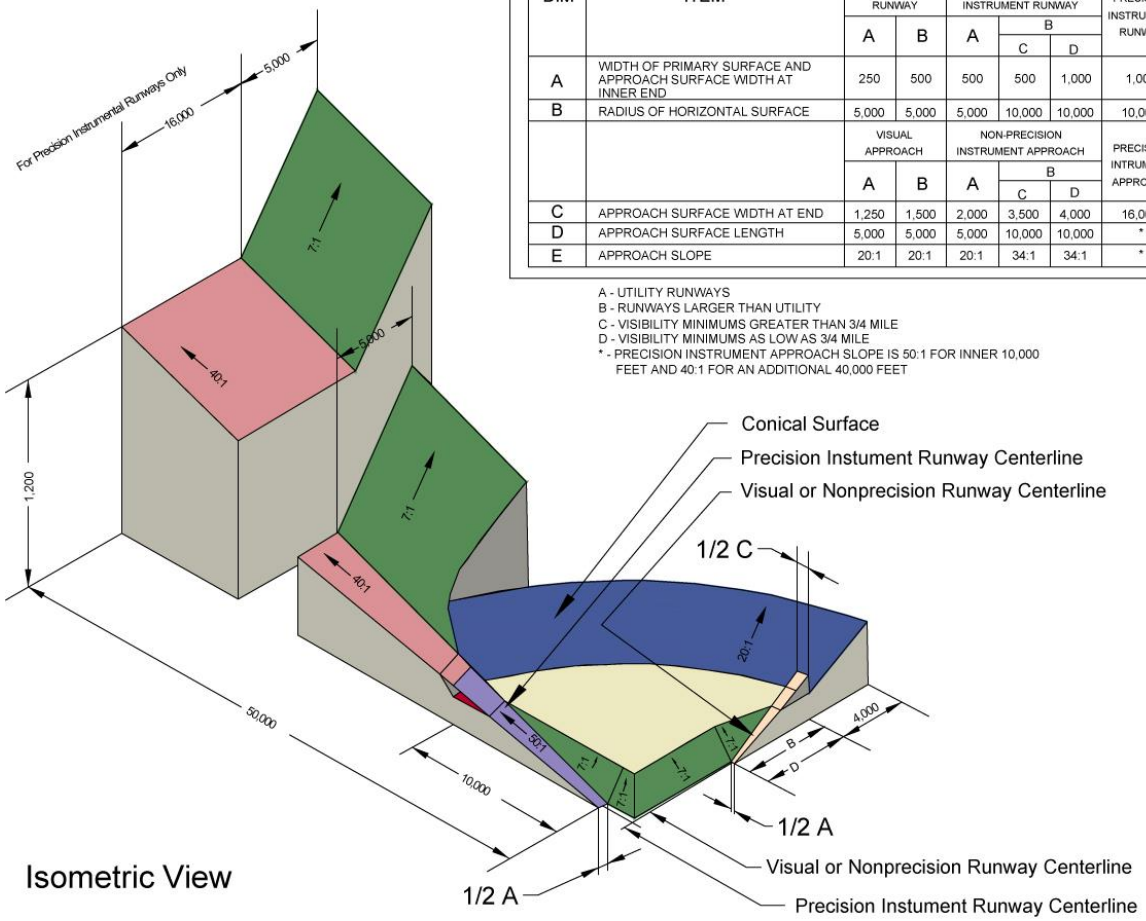
Dimensions of FAR Part 77 surfaces, like RPZs, vary depending on the type of runway approach. At COS, Runways 17L, 35L and 35R accommodate precision approaches while Runways 17R and 31 accommodate non-precision approaches. Runway 13 has a visual approach only. Precision approaches provide aircraft with horizontal (left/right) information for alignment on a runway centerline, as well as vertical glide slope information to the end of a runway. Non-precision approaches provide only horizontal information to a runway centerline. **Figure 4-4** graphically illustrates the FAR Part 77 "Imaginary Surfaces" in both plan view and profile view representations.

Figure 4-4: Typical Airport Part 77 Surfaces



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INTRUMENT APPROACH
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



Source: FAA

Although the FAA can determine which structures are obstructions to air navigation, it is not authorized to regulate tall structures. Under FAR Part 77, an aeronautical study can be undertaken by FAA to determine whether the structure in question would be a hazard to air navigation. However, there is no specific authorization in any statute that permits the FAA to limit structure heights or determine which structures should be lighted or marked. In fact, in every aeronautical study determination, the FAA acknowledges that state or local authorities have control over the appropriate use of property beneath an airport's airspace.

Definitions for the FAR Part 77 surfaces and the current dimensions of those surfaces at COS are presented in the following sections.

Primary Surface - The primary surface is longitudinally centered on a runway. When the runway has a hard surface, the primary surface extends 200 feet beyond each end of the runway. The width of a primary surface ranges from 250 feet to 1,000 feet, depending on the existing or planned approach and runway type (e.g., visual, non-precision, or precision). For all runways at COS, the primary surface has a width of 1,000 feet.

Transitional Surface - Transitional surfaces extend outward and upward at right angles to the runway centerline, with the runway centerline extended at a slope of seven feet horizontally for each foot vertically (7:1) from the sides of the primary and approach surfaces. The transitional surfaces extend to where they intercept the horizontal surface at a height of 150 feet above the runway elevation. Transitional surfaces for those portions of the precision approach surface, which project through and beyond the limits of the conical surface, extend a distance of 5,000 feet horizontally from the edge of the approach surface and at right angles to the runway centerline.

Horizontal Surface - The horizontal surface is a horizontal plane located 150 feet above the established airport elevation, covering an area from the transitional surface to the conical surface. The perimeter is constructed by swinging arcs from the center of each end of the primary surface and connecting the adjacent arcs by lines tangent to those areas. For all approaches to runways supporting large aircraft, the case for all runways at COS, the radius of each arc used to construct the horizontal surface is 10,000 feet.

Conical Surface - The conical surface is a surface extending upward and outward from the periphery of the horizontal surface at a slope of one foot for every 20 feet (20:1) for a horizontal distance of 4,000 feet.

Approach Surface - Longitudinally centered on the extended runway centerline, the approach surface extends outward and upward from the end of the primary surface. An approach surface is applied to each end of each runway based on the type of approach. The approach slope of a runway is either 20:1, 34:1, or 50:1, depending on the sophistication of the approach. FAA approach surfaces are 20:1 for visual approaches, 34:1 for non-precision approaches, and 50:1 for precision approaches.

The approach slopes for Runways 17L, 35L and 35R are 50:1. The approach slopes for Runways 17R and 31 are 34:1. The visual approach on Runway 13 calls for an approach slope of 20:1. It is important to note that these are Part 77 approach surfaces related to obstruction clearances for specific runway ends based on available approach types, they are not aircraft approach angles.

Part 77 Surfaces Summary - An important component of the Airport Layout Plan (ALP) that is developed for COS during the Airport Master Plan process includes a depiction of the obstructions to existing and future Part 77 surfaces. The Airspace Plan and the Inner Portion of the Approach Surface Plan included in the ALP identify those objects, both natural and man-made, that penetrate Part 77 surfaces and identifies recommended means for mitigating their impacts.

An obstructions analysis has been conducted as part of this Airport Master Plan and will be reflected in the Airport Layout Plan (ALP) set. To help ensure safe operations on and around the Airport, and in conformance with its grant assurances, it is recommended that COS continue to be diligent in preventing and removing obstructions from its critical airspace surfaces. The Airport Advisory Commission actively reviews and makes recommendations on land use proposal submitted by the city when they involve the Airport Overlay Area.

Navigational Aids (NAVAIDs)

Navigational aids (NAVAIDs) are any visual or electronic devices, airborne or on the ground, that provide point-to-point guidance information or position data to aircraft in flight. Airport NAVAIDs can provide guidance to the airport or to a specific runway end at the airport. An airport is equipped with NAVAIDs providing specific capabilities; for example, precision, non-precision, or visual approaches, based on airport operational needs, safety considerations, and planning/design standards. The type, mission, and volume of aeronautical activity in association with meteorological, airspace, and capacity considerations determine an airport's eligibility and need for various NAVAIDs.

Existing NAVAIDs at COS and their respective capabilities are presented in the following sections:

- Instrument NAVAIDs
- Visual Landing Aids

NAVAID facility requirements are primarily determined by the needs of aircraft operators frequently using the airport and typical weather-related and operational characteristics in the airport area. These factors as they relate to COS and the potential instrument NAVAID and visual land aid facility requirements identified for the Airport are examined in the following sections.

Instrument NAVAIDs - This category of NAVAIDs provides assistance to aircraft performing instrument approach procedures at an airport. An instrument approach procedure is defined as a series of predetermined maneuvers for

guiding an aircraft under instrument flight conditions from the beginning of an initial approach to a landing, or to a point from which a landing may be made visually. Instrument NAVAIDs also facilitate aircraft departures during inclement weather conditions. Instrument approaches are categorized as either precision or non-precision with precision approaches providing both vertical and horizontal guidance to aircraft on final approach to a runway, while non-precision approaches only provide horizontal data.

The standard type of precision approach available today is the instrument landing system (ILS) approach. A Category I (CAT I) ILS provide precision approach capability in weather conditions with cloud ceilings as low as 200 feet and visibility of one-half mile. Category I ILS approaches are available to Runway 17L. Existing precision approach capabilities at COS also include a more advanced, Category II with special authorization (CAT II SA) ILS. The existing CAT II SA ILS approach to Runway 35L and 17L at COS allows a descent and landing in cloud ceilings as low as 123 and 150 feet above ground level (AGL), respectively. Air crew and aircraft must be specially certified to follow CAT II SA ILS approach procedures.

RVR values are derived from a series of transmissometers consisting of transmitters and receivers that determine visual range values electronically and then convert these values to horizontal distance equivalents. Typically, on runways greater than 8,000 feet, transmissometers are placed at the touchdown, mid-point, and roll-out areas of the runway. This equipment provides pilots with real-time, electronic data that facilitates their decision-making process related to instrument approach procedures.

Non-precision approaches are also available to most runway ends at COS. Non-precision approaches include VHF (Very High Frequency) Omni-directional Radio-range (VOR), Nondirectional Radio Beacon (NDB), and Global Positioning System/Area Navigation (GPS/RNAV) facilities which generally have minimum decent altitudes of 600 to 800 feet and visibility minima of ¾ mile to two miles. All available approaches and their current decision height and sight distance minimums at COS were presented in Chapter Two, *Inventory of Existing Conditions.*

Any shifts in runway thresholds require the localizer and glide slope antenna for the ILS to be relocated. Additionally, based on discussions with airport management, frequency of instrument conditions, and types of operations at COS, it is recommended that approach minimums to Runway 35R lowered to ¼ mile. To achieve this, additional equipment and approach lighting may be necessary. Approaches to Runway 13-31 are adequate throughout the planning period.

Visual Landing Aids - Visual landing aids provide aircraft guidance to and alignment with a specific runway end, once the airport is within a pilot's sight. Visual landing aids typically include equipment associated with approach lighting and visual approach aids. Approach lighting systems provide the basic means to transition from instrument flight to visual flight for landing. The variety of

approach lighting systems are similar in that each provides a series of signal lights starting in the approach area and extending for 2,400 feet to 3,400 feet to the runway threshold. The visual landing phase of flight, in both visual and instrument conditions, is also facilitated by visual approach aids which provide pilots with basic visual glideslope information during final approaches.

Existing visual landing aids at COS include the following:

Wind Cones – The Airport has wind cones located near the end of each runway to provide pilots with wind direction and velocity information as they land or takeoff. With the completion of the Runway 17R-35L shift project, associated wind cones should be relocated. Although sufficient for the planning period, wind cones should be routinely inspected and replaced when tattered or torn.

Approach Lighting System (ALS) – Current ALS at the Airport includes a medium intensity approach lighting system with runway alignment indicator lights (MALSR) for Runway 17L and 35L.

Visual Approach Aids – Visual glide slope indicators (VGSI), examples of which include visual approach slope indicators (VASIs) and precision approach path indicators (PAPIs) are common types of visual approach aids. A VGSI is a system of lights located adjacent to a runway that provide a pilot with proper approach angle information. Using the VGSI light system, a pilot can determine if the aircraft is high or low on the approach path and take corrective action. All runway ends at COS are equipped with PAPIs. All runway ends, except those with MALSRs, are equipped with runway end identifier lights (REILs) consisting of one high intensity flashing strobe light on each side of the runway threshold. REILs are not necessary for runways equipped with ALS.

Existing visual landing aids at COS are adequate based on the current airfield configuration, instrument approach capabilities, and activity characteristics. It is recommended that a MALSR or ALSF-2 combined with in-runway centerline lighting and touchdown zone lighting be added to Runway 35R to provide enhanced identification of the runway environment to support a future CAT II ILS approach. Should the development of this or any other precision approach procedures be pursued, it would be necessary to install ALS to support those precision approaches. Any shifts in thresholds or runway extensions require the visual landing aids to be shifted accordingly to maintain approach capabilities.

It is recommended that a MALSR or ALSF-2 combined with in-runway centerline lighting and touchdown zone lighting be added to Runway 35R to provide enhanced identification of the runway environment to support a future CAT II ILS approach.

Airfield Marking, Lighting, and Signage

The safe movement of aircraft and other airport vehicles about the airfield is facilitated by airfield marking, lighting, and signage. Airfield areas that are properly marked, lighted, and signed allow pilots to efficiently and safely navigate to their destinations. The Airport Traffic Control Tower's (ATCT's) ability to safely manage ground traffic is also aided by these facilities.

Runway Markings - Runway markings are designed according to the type of approach available on the runway. FAA AC 150/5340-1M, *Standards for Airport Markings*, provides guidance related to airport pavement markings. Runways 17L-35R and 17R-35R at COS currently have precision runway markings that include runway designations, centerlines, threshold markings, aiming points, touchdown zones, and side stripes. Runway 13-31 has non-precision markings that includes runway designations, centerline, threshold markings, and aiming points.

The markings on all runways are currently in good condition and are compliant with existing standards. The airport airfield maintenance crew should actively monitor, inspect, and repaint markings as they degrade over time. Any runway or taxiway development should incorporate re-striping to meet/maintain current FAA marking standards.

Airport Lighting - Airport lighting systems aid pilots in locating an airport and safely conducting aircraft operations during nighttime and other low-visibility conditions. Existing airport lighting systems at COS include the following:

Airport Rotating Beacon – Since it is a lighted, land-based airport, COS is equipped with a beacon consisting of alternating white and green light that is visible for several miles at night. It serves as a universal identifier of an airport and operates during evening hours as well as instrument meteorological conditions. The Airport's rotating beacon was recently relocated to the midfield, near Taxiways M and F.

Runway Edge Lighting – Runways 17R-35L and 17L-35R are equipped with high intensity runway edge lighting (HIRL) providing pilots with further identification of runway pavement limits during periods of reduced visibility. Runway 13/31 is equipped with medium intensity runway edge lighting (MIRL).

Touchdown Zone Lighting – Runway 17L-35R has touchdown zone lighting (TDZL) that help pilots identify the touchdown zone.

Taxiway Edge Lighting - Like runway edge lighting, taxiway edge lighting identifies the limits of paved taxiway areas and facilitates the effective movement of aircraft on the ground during periods of reduced visibility. Taxiways serving all runways at COS are equipped with medium intensity taxiway lighting (MITL).

Existing lighting systems at the Airport are sufficient for the planning period. Any new or updated runway or taxiway facilities at COS should be equipped with comparable lighting systems.

Airfield Signage - Airfield signage provides pilots with directional ground instruction to enable them to identify their location on the airfield as well as directions to other airport facilities. Signage also facilitates the airport traffic control's responsibility of safe and efficient ground control on the airfield. Directional signage aids pilots in locating runways, taxiways, apron areas, and mandatory holding positions. Review of the existing airfield signage layout drawings shows that COS meets current airfield signage requirements. On-site inspection of these signs should be conducted on a routine basis to ensure that these signs are properly maintained and meet FAA standards. Future airfield facilities should include corresponding signage to properly direct pilots and aid ATCT in the management of ground movement on the airfield.

COS's existing airfield lighting, markings and signage meet current FAA standards and are in good condition; no action is required beyond maintaining in good condition.

Passenger Terminal Requirements

This section focuses on the terminal space requirements for COS. Space programming seeks to establish gross size requirements for various components of the terminal facilities and to identify potential improvement projects necessary to maintain efficient operation in the future. The following topics have been examined to identify those facilities required to meet future demands.

- Planning Activity Levels (PAL)
- Terminal Space Requirements
- Gate Requirements
- Terminal Area Aircraft Apron
- Automobile Parking and Rental Car

Planning Activity Levels (PAL)

Terminal space, as well as other volume or activity derived facility requirements, are typically identified based on the maximum number of people traveling through specific functional areas during that airports' peak (busiest) time period. Derived from aviation activity forecasts, PALs represent the demand variable used to calculate space requirements.

Forecasts of enplaned passengers, air cargo tonnage, aircraft operations, and aircraft based at COS were developed for the forecast horizon years. However, many variables can affect the achievement of forecasts such as regional, national, and international economic conditions as well as changes in airline service patterns. For this section of the Master Plan, it is prudent to use a strategic

planning approach whereby PALs, rather than forecast horizon years, are used to determine the timing for future airport development projects.

Table 4-22 depicts the PALs for major forecasted activity components. PAL 1, PAL 2, PAL 3 correspond to the aviation demand forecast years for 2026, 2036, and 2041. PAL 4 reflects the higher growth scenario projection of activity at COS that may be considered for ultimate requirements. The aviation demand associated with each planning activity level is summarized in **Table 4-22**.

Table 4-22: Summary of Planning Activity Levels

	2021	PAL 1	PAL 2	PAL 3	PAL 4 (High Growth)
Enplanements					
Peak Hour	510	607	698	748	1,058
Annual	**764,627**	**1,055,606**	**1,201,148**	**1,281,280**	**1,586,497**
Cargo					
Landed Weight (lbs.)	**104,047,500**	**110,988,729**	**126,291,270**	**134,716,427**	**142,924,213**
Operations					
Category					
Air Carrier	13,169	16,917	22,084	24,996	26,523
Air Taxi	14,632	13,841	11,891	10,712	11,367
General Aviation	86,330	86,121	91,733	94,627	100,409
Military	32,191	36,909	44,168	48,206	51,151
TOTAL	**146,322**	**153,787**	**169,875**	**178,541**	**189,450**
Local vs. Itinerant					
Local Operations	39,507	41,522	45,866	48,206	51,151
Itinerant Operations	106,815	112,265	124,009	130,335	138,299
Peak Hour	**80**	**85**	**93**	**98**	**104**
Based Aircraft					
Type					
Single Engine	154	164	175	189	230
Multi-Engine	35	32	44	42	51
Jet/Turboprop	22	34	60	72	87
Helicopter	2	6	10	15	18
Glider/Other	2	2	3	4	5
Military	12	26	44	57	69
TOTAL	**227**	**265**	**336**	**378**	**460**

Source: Master Plan Forecasts, Jviation

Conclusion: PALs help establish key development milestones based on activity levels rather than years. This provides the Airport with the flexibility to consider the expansion of facilities based on the actual timing that passenger demand levels are achieved rather than forecasted.

Terminal Space Requirements

Projected space requirements necessary to accommodate future travelers and other terminal users at COS are included in this section. The appropriate passenger demand variable has been applied to various terminal elements to assess the need for additional space in functional areas. Specifically, existing space is compared to existing and future space requirements and used to identify the need for additional capacity in specific functional areas. Facility space requirements for a terminal are a function of variables unique to each airport. The number of airlines, types of aircraft, airline schedules, operating characteristics, and airport supporting activities are all important factors used to determine space requirements. However, annual and peak hour passenger activity, a derivative of all these variables, plays the key role in determining most of the minimum space requirements.

Most functional elements of the terminal building at COS, including airline, concession, public, and administrative/support areas, are sized based on peak hour enplanement characteristics, and projections of annual enplanements/deplanements (for this study, deplanements area considered to be equal to enplanements) for each of the PALs. (Note that specific methodologies and planning factors applied in the development of individual space calculations were discussed earlier in the demand/capacity section of this chapter.) **Table 4-23** summarizes facility requirements for each major component or functional area of the passenger terminal building and its operation.

Table 4-23: Terminal Space Requirements

Functional Area	Existing Space (ft^2)	Planning Factor (ft^2)	Planning Factor Variable	PAL 1	PAL 2	PAL 3	PAL 4
Airline Space							
Airline Ticket Counter	6,700	3.6	PHEP	1,836	2,185	2,513	3,809
Ticket Counter Queuing	10,000	12.6	PHEP	6,426	7,648	8,795	13,331
Airline Ticket Office	8,300	8.5	PHEP	4,335	5,160	5,933	8,993
Baggage Service Office	1,300	2.4	PHDP	1,224	1,457	1,675	2,539
Outbound Baggage Service Area	11,400	30.0	PHEP	15,300	18,210	20,940	31,740
Baggage Claim Area	15,300	20.0	PHDP	10,200	12,140	13,960	21,160
Operations Space	20,250	0.01	AEP	7,646	10,556	12,011	15,865
Hold rooms	28,319	1,800	Gate	15,887	17,228	17,350	20,464
Sub Total	**101,569**			**62,854**	**74,584**	**83,177**	**117,901**
Concession Space							
Food/Beverage	12,200	0.01	AEP	7,646	10,556	12,011	15,865
Retail	6,250	0.005	AEP	3,823	5,278	6,006	7,932
Rental Car	3,120	0.002	ADP	1,529	2,111	2,402	3,173
Other Concession Space	5,000	0.004	AEP	3,059	4,222	4,805	6,346
Sub Total	**26,570**			**16,057**	**22,168**	**25,224**	**33,316**
Public Space							
Restrooms	7,475	5.0	PHEP	5,100	6,070	6,980	10,580
Circulation (secure and non-secure)	77,775	0.06	AEP	45,878	63,336	72,069	95,190
TSA Baggage Inspection Stations	17,800	20.0	PHEP	10,200	12,140	13,960	21,160
TSA Checkpoint (station screen rate = 190 combined pax/hr)	8,000	1,500	Checkpoint & PHEP	4,026	4,792	5,511	8,353
Minimum Number of Checkpoints (not in sub total)	*4*	190	PHEP	*3*	*3*	*4*	*6*
Sub Total	**111,050**			**65,204**	**86,338**	**98,519**	**135,282**
Administrative and Other Support Areas							
Administration Offices	28,700	0.03	AEP	22,939	31,668	36,034	47,595
DEA, Police, ID/Pass, TSA Offices	3,000	0.002	AEP	1,529	2,111	2,402	3,173
Utility/Mechanical Space	28,000	0.03	AEP	22,939	31,668	36,034	47,595
Sub Total	**59,700**			**47,407**	**65,448**	**74,471**	**98,363**
Grand Total	***298,889***			***191,522***	***248,537***	***281,391***	***384,863***

Source: Existing space provided by Airport Management, space requirements derived from Master Plan Forecasts, Jviation
Notes: PHEP: Peak Hour Enplaned Passengers PHDP: Peak Hour Deplaned Passengers
AEP: Annual Enplaned Passengers ADP: Annual Deplaned Passengers

Based on the analysis above, the overall terminal building has adequate space to accommodate over 1.2 million annual enplaned passengers (PAL 3). Individual areas, however, may experience capacity issues before reaching that level as

evidenced by comparing existing space to various PAL values above. These functional areas include baggage service office, outbound baggage service, administrative office, and utility/mechanical spaces. While most of these areas could become deficient by the PAL 3 level of activity, areas that have an abundance of space could be redeveloped to make up for deficiencies. By the time COS achieves PAL 4, many areas of the terminal building may require expansion to include a terminal-wide redevelopment effort.

Sections of the existing terminal building may require reconfiguration and/or expansion prior to reaching PAL 3. While realignment of existing facilities may aid in capacity issues, by PAL 4, most terminal building areas will require expansion.

Gate Requirements

Projected gate requirements necessary to accommodate forecasted aircraft activity have been identified in this section. These requirements focus on the future gate demand for air carriers and are derived from aviation activity forecasts and current and anticipated operational characteristics.

Similar to terminal space requirements, gate requirements are unique to every airport and are a function of many factors. The volume of passengers, number and frequency of flights, and the type of aircraft serving the airport are some of the determining factors used for gate demand analyses. In this gate analysis, the number of gates required for the planning activity levels are given.

The following methodology was used in determining gate demand for each benchmark year:

- The planning activity levels (PAL) are used to provide annual enplanements.
- The number of peak hour passengers in each PAL were determined by applying the average day-peak month percentages found in the COS passenger activity profile presented in this chapter.
- The projected fleet mix for each PAL was used to determine the average seats per aircraft. In effect, this weights the aircraft type to create an Equivalent Aircraft Index (EQA) allowing each type of aircraft to be represented in the calculation while accounting for its size relative to the others.
- The number of departures per day was obtained by applying the estimated load factor percentage (seats actually occupied during a flight) and dividing it by the peak hour PAL passenger calculation. Current airline schedule data was obtained from Airport management to confirm actual daily scheduled departures and calculation methods.

- The number of daily departures per gate was then multiplied by the number of departures per day. In certain circumstances the EQA rule was reduced in the gate calculation to account for inefficiencies in an exclusive-use gate environment. In a common-use gate environment, the percentage of flights in the peak hour was utilized to calculate gate demand and remove the inefficiencies found in exclusive-use facilities. Note that shared use gates are usually found at airports with numerous air carriers and a limited number of gates to serve them; they are typically configured with almost no airline-specific distinguishing signage or features in order to allow multiple carriers to operate at one gate. Given the nature of operations and the preferential-use facilities to which air carriers have become accustomed at COS, it is possible that preferential -use gates will be provided to each airline throughout the planning period, although shared use will be considered as an option if it becomes necessary to manage air carrier demand in the future.

- The length of dwell time (average time an aircraft is occupying a gate) was applied to the number of peak hour departures, resulting in the number of gates required. For this analysis, an average dwell time of 1 hour was used for each PAL. Some airlines may have lower dwell times, but this conservative approach allows for possible delays and operational contingencies.

Table 4-24 presents the existing and future gate requirements calculated for COS based on projected demand. As the table illustrates, the 12 gates currently in place in the COS main terminal provide sufficient capacity to accommodate existing demand. Additionally, it is anticipated that these gates will be adequate to satisfy gate requirements throughout the planning period. It is important to remember, however, as COS gets closer to reaching capacity, new development should be planned and designed in order to accommodate demand as the Airport gets closer to (not exceeding) demand.

Table 4-24: Gate Requirements

	Existing Gates	PAL 1	PAL 2	PAL 3	PAL 4
Air Carrier Gates	12	9	10	10	11

Source: Jviation

The number of existing gates in the COS main terminal is adequate. As the Airport nears PAL 4, planning and design for gate expansion should be considered.

Terminal Area Aircraft Apron

Utilization of terminal area apron space is a crucial aspect of the passenger service operation at COS. Recommendations to maintain and expand the functionality of this space have been provided in this section.

The gate and apron areas at COS were designed to accommodate a full range of aircraft including narrow and widebody aircraft. The apron also accommodates deicing of passenger aircraft. As discussed earlier, a significant share of passenger aircraft serving COS are regional jet and commuter aircraft, which require less apron area than narrow and widebody aircraft. While the size of passenger aircraft serving COS is expected to increase throughout the planning period, the existing apron area and its current gate configuration will accommodate the type and size of aircraft expected.

However, the Airport has also expressed concern over continued use of the apron for deicing as they serve larger aircraft. As a means of maintaining adequate space for larger aircraft on the terminal apron, it is recommended that a dedicated deicing apron be constructed adjacent to the terminal area. This will eliminate deicing operations from occurring on the terminal apron, allowing for larger aircraft movement and circulation, as well as the potential for overnighting aircraft.

The Airport would benefit from additional apron space. Constructing a dedicated deicing would provide some operational relief for the terminal apron, providing additional capacity for overnight aircraft parking or other uses.

Automobile Parking and Rental Car

Providing sufficient parking facilities to meet growing and changing Airport passenger, tenant, and employee needs is a key component of the planning process. An analysis of current and anticipated future parking requirements is presented within this section. From an overall perspective and using current supply demand ratios, **Table 4-25** presents a summary of the total number of spaces needed based on PALs. Note that based on Airport reports, this analysis is based on the assumption that the existing overall parking system is currently largely operating at capacity and is experiencing occasional issues due to lack of available space. The realignment and allocation of parking spaces by type could remedy some of these capacity issues while an overall expansion will ultimately be required to resolve this issue. The expansion and reallocation of parking facilities will be discussed in the following sections.

Table 4-25: Parking Facility Requirements

PAL	Supply	Demand	Surplus/(Deficit)
Existing	6,563	6,563	0
PAL 1	6,563	9,132	(2,569)
PAL 2	6,563	10,390	(3,827)
PAL 3	6,563	11,084	(4,521)
PAL 4	6,563	13,724	(7,161)

Source: Jviation

As shown above, based on the assumption that the overall parking system is generally operating largely at capacity, the Airport will experience a deficiency in

parking space within the short term. By PAL 4, and based on current ratios, the Airport will require more than twice as many parking spaces as it has today.

Because the Airport's parking system serves multiple users with different requirements and preferences, it is important to examine parking facilities separately to account for their unique characteristics and requirements. Independent evaluations were conducted for each of the following categories of parking facilities:

- Public Parking
- Employee Parking
- Rental Car Facilities

Public Parking

Public parking facilities at COS are located in lots directly in front of the terminal building and represent the greatest share of parking spaces at the Airport. Airport data indicates that there are currently 4,586 spaces between the short-term and long-term lots (not including the overflow lot). The short-term lot has 711 spaces and frequently reaches capacity. The long-term lot has 3,875 spaces, and although it occasionally reaches capacity, that primarily occurs during the heavy period of peak activity (holidays). During those events, the overflow lot (875 spaces) is used. To address short-term lot issues, the reallocation of rental car parking is recommended through the development of a consolidated rental car (CONRAC) facility. This would provide an additional 768 parking spaces in the short-term lot, effectively doubling its capacity. To address long-term public parking issues, it is recommended that one or more long-term or economy lots be developed of equal size to the existing lot. This would provide adequate public parking capacity to PAL 4.

Employee Parking

Between the east and west employee parking lots, there are 275 parking spaces available for employees, vendors, tenants, etc. Similar to the public lots, these lots can reach capacity during peak periods. As suggested by Airport management, to address the issues, overflow employee parking can be assigned to the long-term lot since there is little to no room to expand or redesign the existing employee lots without impacting other important passenger terminal facilities.

Rental Car Facilities

Existing rental car facilities at COS include counter and office space (examined previously in the terminal space analysis) as well as parking and service facilities. Facility requirements related to rental car parking areas and service facilities are presented below. It should be noted that the analysis of rental car parking facilities focuses on ready/return parking spaces located proximate to the terminal that support customers picking up or returning their rental cars.

Rental car ready/return parking spaces are located in front of the Airport terminal building and adjacent to the short-term lot. There are a total of 768 ready/return spaces available to meet the needs of the Airport's on-airport rental car operators. The supply of ready/return spaces at COS is considered adequate throughout the planning period, with no reported capacity issues. However, as suggested previously, the reallocation of this lot to short-term parking would provide much needed space for public parking. The development of a CONRAC, as suggested above, would provide rental car agencies with consolidated and dedicated facilities outside the public parking venue. A future CONRAC should include combined services and activities performed by the rental car agencies including ready/return parking, service facilities, and rental car counters and offices. Alternative locations for the CONRAC will be studied further in the next chapter.

Development of a CONRAC will effectively double the space for short-term public parking. The CONRAC should be designed to incorporate all rental car services and facilities. Additional long-term or economy parking is recommended.

Passenger Terminal Summary

The existing terminal area is adequate to accommodate existing, short, and intermediate-term passenger activity levels. It should be noted, however, a concourse modernization project taking place in the next 3 to 5 years will increase the hold room space while decreasing the retail concession space. It is recommended that COS consider ultimate terminal expansion to be prepared for the highest levels of passenger service. This expansion could include an increased number of gates, additional hold rooms, wider concourses, additional space for concessions, among other elements. Development of a dedicated deicing apron for passenger aircraft will preserve apron space for aircraft movement and storage. When the main terminal is expanded, it is recommended that the East Terminal Unit be removed to provide additional apron space for aircraft maneuvering and storage. While a recommended terminal layout will be provided in the next chapter, additional study and architectural services are the next steps in carrying out terminal expansion.

General Aviation Requirements

Existing general aviation facilities at COS are located west of the passenger terminal complex in an area referred to as the Westside Development Area. Facility requirements related to general aviation facilities at the Airport are developed based on an analysis of existing facilities, current and planned utilization of those facilities, projected aviation demand, and the ultimate development potential of the Westside Development Area.

Requirements are identified for the following general aviation facilities:

- FBO Facilities
- Corporate Aviation Facilities
- Aircraft Storage

Projections of aviation demand developed in Chapter Three estimated that the number of general aviation aircraft based at the Airport, the vast majority of which are stored in hangars, will increase from 227 to approximately 378 by the end of the planning period. This facility requirement analysis examines the ability of general aviation facilities at COS to accommodate current and anticipated activity levels, and identifies those development needs necessary to adequately support the Airport's general aviation users.

Options for the development of general aviation facilities were examined in the 2016 COS General Aviation Area Plan and have been incorporated into this Airport Master Plan. Note that the 2016 plan included expansion of the apron and hangars as well as large facilities to accommodate the maintenance of aircraft of all sizes.

FBO Facilities

FBO facilities at COS primarily consist of aircraft maintenance hangars, aircraft storage hangars, and fuel storage facilities. (Aircraft storage hangar requirements and fuel storage requirements have been addressed in separate sections of this chapter.) The Airport's FBOs intend to maximize development in the existing general aviation area prior to relocating or developing additional facilities in other areas of the Airport. The existing general aviation facilities are constrained, and it is anticipated that they will reach their capacity potential within the planning period. Projections of general aviation activity anticipate growth in based aircraft, including based jet aircraft. An important consideration in the master planning process is also reserving sufficient space for potential FBO development needed to support the Airport's growing based aircraft fleet.

Space for FBO expansion should be made available to the FBOs as demand increases.

Corporate Aviation Facilities

Corporate hangar facilities are frequently constructed by businesses and corporations needing aircraft storage facilities for their corporate aircraft. In most cases, the corporations lease land from an airport then fund the construction of the hangar and flight support facilities necessary to meet their needs. Under such an arrangement, the airport sponsor may be responsible for some infrastructure development, such as taxiway construction, to support the needs of the corporate tenant. As illustrated by historic and projected national trends, as well as the COS forecasts of aviation activity, corporate aviation will continue to be an important and growing component of general aviation activity at the Airport.

The potential development of corporate facilities at the Airport is an important consideration in the master planning process. Based aircraft projections

developed for COS anticipate an increasing number of jets based at the Airport. Some of the growth in based jets is anticipated to be driven by the development of corporate aviation facilities. The development of corporate aviation facilities at COS will be driven by the interest of specific tenants. Examining development alternatives and having adequate planning in place will allow the Airport to more efficiently complete infrastructure development that may be necessary to support potential corporate hangar tenants at COS.

In-fill development and expansion of hangar areas for corporate aviation should be included in the future development plan of the Airport.

Aircraft Storage

Storage needs for general aviation aircraft generally reflect local climatic conditions in combination with the size and sophistication of the airport's-based aircraft fleet. Typically, the more valuable the aircraft, the more likely it is to be stored in large, secure facilities.

Apron Tiedown Storage - Approximately 8 percent (18, currently) of COS's based aircraft are stored on the general aviation apron with the remainder of the based aircraft stored in hangars. Given the regional climatic conditions and the types of general aviation aircraft that frequent COS, this is a reasonable ratio. If that ratio were to be maintained, approximately 30 aircraft will ultimately be based on apron tiedowns by the end of the planning period.

In addition to providing permanent storage for based aircraft, aircraft tiedown positions managed by the Airport's FBOs also support the temporary storage of transient general aviation and military aircraft at COS. Transient, or visiting, aircraft tiedown requirements are impacted by the number of transient operations occurring at an airport. As the number of operations increase, the demand for itinerant apron tiedown space will also increase. In order to calculate the demand for transient aircraft tiedown positions at COS, the following methodology was used:

- Estimated the number of itinerant operations.
- The number of annual itinerant operations was then multiplied by 50 percent (50 percent of the operations equal departures), divided by 12 (12 months per year), and divided again by 30 (days in peak month). This number is assumed to be the average daily number of itinerant arrivals.
- This number was then increased by 10 percent to account for busy periods.
- It has also been assumed that 35 percent of the busy day arrivals will be on the apron at any given time.

The results of this methodology, based on the planning activity levels developed for COS, are summarized in **Table 4-26.**

Table 4-26: Tiedown Requirements

	Total Itinerant GA and Military	Average Daily Number of Itinerant Arrivals	Required Transient Tiedowns	Required Based Aircraft Tiedowns	Total Required Tiedown Spaces
2021	106,815	148	57	18	75
PAL 1	112,265	156	60	21	81
PAL 2	124,009	172	66	24	90
PAL 3	130,335	181	70	27	97
PAL 4	138,299	192	74	30	104

Source: Jviation

Given that COS only has approximately 84 tiedowns on the general aviation apron, COS will need to expand the tiedown apron before reaching PAL 2 or 120,000 itinerant operations.

Hangar Storage – Approximately 209 aircraft, or 92 percent of the based aircraft at COS are stored in hangars. Like many other airports, most of the single-engine piston general aviation aircraft at COS are stored in smaller hangar facilities such as T-hangars. Most multi-engine piston aircraft and all jets and helicopters are stored in community and conventional hangars.

To estimate future hangar storage needs at COS, current storage characteristics by aircraft type have been applied to the general aviation based aircraft projections developed in Chapter Three, and are summarized in **Table 4-27**. All military based aircraft at COS are stored in hangars at Peterson Space Force Base and have not been considered in this calculation.

Table 4-27: General Aviation Fleet Breakdown

	Single Engine	Multi-Engine	Jet	Helicopters	Glider/Other	Total
2021	154	35	22	2	2	215
PAL 1	164	32	34	6	2	238
PAL 2	175	44	60	10	3	292
PAL 3	189	42	72	15	4	322
PAL 4	230	51	87	18	5	391

Source: Jviation

Table 4-28 presents estimates of future general aviation hangar storage requirements at COS based on current and anticipated future storage preferences and projections of based general aviation aircraft at the Airport. This approach assumes 10 percent of multi-engine aircraft will be stored in T-hangars, the remainder will be stored in conventional or community hangars.

Table 4-28: Aircraft Storage Requirements

	Stored on Apron	Stored in T-Hangar	Stored in Conventional/ Community Hangar	Total
2021	18	140	58	215
PAL 1	21	146	71	238
PAL 2	24	155	113	292
PAL 3	27	166	129	322
PAL 4	30	205	156	391

Source: Jviation

As mentioned in Chapter Two*, Inventory of Existing Conditions*, T-hangars at COS currently accommodate 175 aircraft. By interpolating the analysis above, additional T-hangars will likely be required by the time the Airport reaches 330 total based aircraft.

Considering feedback from Airport management, as well as tenants and users, it is understood that existing conventional and community hangar space at COS is extremely limited. By the time COS reaches PAL 2, the Airport will require double the amount of current conventional/community hangar space available today. Accommodating this level of expansion will require prioritization of aeronautical development space with access to the taxiway/runway system. The Westside Development Area has limited in-fill development opportunity as shown in the General Aviation Area Plan. Recommendations from that plan will be carried forward in this Master Plan. Additional area for conventional/community hangar development lies along Taxiway E with convenient access to Runway 17L-35R.

Hangars and aircraft maintenance facilities capable of servicing all aircraft types should be shown in the Westside Development Area as well as the development area along Taxiway E.

Air Cargo Requirements

The Airport maintains two air cargo facilities: a belly cargo facility for passenger airlines and a facility capable of serving air cargo airlines. An 11,000 square foot belly cargo facility is located west of the terminal facility for easy access by airline staff and ground handlers. FedEx occupies facilities located in the Westside Development Area, operating out of several buildings that total approximately 45,000 square feet.

Total air cargo landed weight at COS has shown almost no growth over the past 10 years. Chapter Three presented forecasts of future air cargo volumes that indicated total landed weight is projected to increase over the next 20 years, spurred by growth in regional employment, population, and economic development. Although it is not certain at this time, the Amazon distribution facilities located in the Airport's Peak Innovation Park may generate additional growth in air cargo activity. Air Cargo projections show as much as 143 million landed pounds at COS within the planning period, representing a 40 percent

increase over current activity levels. This level of growth would require the development of additional air cargo facilities at COS.

Increased cargo volumes and the corresponding needs for expanded sort facilities and additional ground delivery equipment could result in increased building, parking, and vehicular circulation requirements at COS. Increased air cargo volumes, employment growth, and a rise in ground-based cargo activity being processed at facilities at COS would result in an increased need for vehicular parking and circulation areas.

The apron, building space, vehicular parking, and circulation requirements of the air cargo area will ultimately be determined by the preferences of the individual operators and their respective network characteristics. Expansion of selected air cargo facilities at COS may be identified as a facility requirement based on tenant needs, but specific future space requirements have not been identified. The alternatives analysis for the Westside Development Area will incorporate apron development to accommodate air cargo facility expansion at the Airport while promoting continued safe and efficient operations. Additionally, hangar and apron development along Taxiway E on the east side of the Airport may also accommodate air cargo activity.

Air cargo facility development should include additional building and apron space near the existing cargo facilities and along Taxiway E.

Support Facility Requirements

Current conditions at the Airport and potential future developments may impact aviation support facilities. The following sections examine facility requirements related to the aviation support facilities at COS:

- Regional Transportation Access
- General Aviation Fuel Storage
- Deicing Operations
- Airport Traffic Control Tower / Airport Surveillance Radar
- Airfield Maintenance Facility

Potential facility requirements associated with these support facilities address current deficiencies and/or allow them to meet the future needs of airport users.

Regional Transportation Access

Access to the regional roadway network is crucial to the success of the Airport. As the City of Colorado Springs attracts residents and business, access to Interstate 25, Peak Innovation Park, Peterson Space Force Base, and planned development to the east of the Airport are important factors that will shape the Airport. PlanCOS is an on-going planning effort designed to address access to the Airport and all other areas within the City. Elements of that plan are integral to

this Airport Master Plan, although this plan takes a more focused view of transportation and access as it relates to the Airport and its interests.

Considering its importance in the planning process and wide range of topics and issues, the study of Regional Transportation Access has been included in an appendix of this Airport Master Plan. The findings and recommendations of PlanCOS will be integrated into the Airport Layout Plan. PlanCOS should be considered to be a standalone document with any further review and consideration being beyond the bounds of the Airport.

The appendix of this Master Plan includes a detailed Regional Transportation Plan (PlanCOS) as it relates to the Airport. Recommendations from PlanCOS will be incorporated into Airport Layout Plan set a necessary.

General Aviation Fuel Storage

Fuel storage for passenger air carriers is located between the commercial terminal building and Runway 17L-35R. This fuel farm is directly supplied by the NuStar Terminal and Pipeline facility located within the Airport's Eastside Development Area. This facility provides fuel receiving, storage, and distribution services for the Airport and the region. Because the air carrier fuel farm is supplied on-demand by a much larger facility, additional capacity is not required within the planning period.

The Westside Development Area has separate aircraft fuel storage facilities at FBO tenant sites including Cutter Aviation, LLC, Colorado jetCenter, and the JHW Hangar Complex. Among the various fuel providers in the Westside Development Area, there are over 120,000 gallons of fuel stored. There are also Jet A and 100LL aircraft fuel tanks located in the COS Business Airpark.

Discussions with airport management related to general aviation fuel storage and distribution facilities indicate that there could be significant benefits and efficiencies in consolidating the multiple fuel farms located in the Westside Development Area into a single, consolidated fuel farm. Based on that premise, the Airport should engage the FBOs and other fuel providers in the Westside Development Area to discuss the benefits and challenges of constructing a consolidated fuel farm. Considerations with respect to this effort include the location of the existing storage sites, costs/benefits of consolidating the systems, potential environmental implications, and potential development sites. A potential new fuel storage site should include above-ground storage tanks with at least 125,000 gallons of overall capacity and be in an area providing sufficient airside and landside access to all users. Chapter Five examines potential fuel storage sites and identifies a recommended location for future development.

It is recommended that consideration be given to the potential development of a consolidated general aviation fuel farm to be located within the Westside Development Area.

Deicing Operations

Deicing fluids, deicing equipment, and airline ground support equipment (GSE) are currently stored on the west side of the terminal apron. Deicing operations are conducted on this area as well, which can cause congestion on the terminal apron during peak operations in icing conditions. To partially address this, a deice apron was constructed at the south end of Runway 17L-35R in 2020 and used in deicing operations. To address further address the terminal area congestion and provide apron area for parked or overnighting aircraft, deicing equipment and operations should be moved to an alternate site.

Due to frequent icing conditions and the long distance between runways (which call for long taxi times and affect deicing effectiveness), it is recommended that two deicing aprons be constructed, one serving the Westside Development Area and the other serving air carriers and others that frequently use Runway 17L-35R.

The Alternatives Analysis conducted in Chapter Five examines potential locations and general design requirements for deicing operations areas for the Airport. Some key factors that are considered in identifying a recommended location for deicing operations and equipment could include roadway and airfield access; proximity to both general aviation and air carrier apron areas; and containment/ environmental requirements.

An east deicing apron designed to accommodate six to seven air carrier aircraft (sized to a Boeing 737) should be constructed along the taxi route to Runway 17L-35R. Additionally, expansion of Westside Development Area apron space could serve as deicing space for aircraft on that side of the field and using Runway 17R-35L.

Airport Traffic Control Tower / Airport Surveillance Radar

The current airport traffic control tower (ATCT) at COS is located on Peterson Space Force Base, north of the airfield. Due to the location and height of the existing tower in combination with the Airport's airfield layout, ATCT controllers experience reduced visibility to some southern areas of the airfield, including the approach ends to Runway 35L and Runway 35R. This condition has been classified by the FAA as a Hot Spot, which is described in the following:

> *Hot Spot 4 (HS 4) The approach ends of Runway 35R and Runway 35L are very far from the control tower. Small aircraft may not be readily visible to the controller. Maintain strict communication with ATCT when in this area.*

As discussed earlier in this chapter, it has been recommended that Runway 17L-35R be shifted south, which would further exacerbate this Hot Spot issue. To resolve this existing and possibly worsening issue, it is recommended that the ATCT be relocated. Factors in re-siting the COS ATCT include height, visibility, line of sight, sun glare, security, access, infrastructure, and others. Chapter Five provides an evaluation of the four potential sites. Although a recommendation is provided as part of this Airport Master Plan, it is important to note that a further

siting analysis will have to be conducted by the FAA before a final determination can be made.

The airport surveillance radar (ASR) at COS is located along the Airport's eastern boundary. To promote the highest and best use of land on and adjacent to the ASR, it is recommended that the radar be relocated. A key design and siting consideration includes a 1,500-foot radius critical area which surrounds the radar and prohibits buildings or structures from interfering with radar signals. Like the ATCT, a recommended ASR site has been provided in the next chapter, but it should be noted that collaboration between the Airport and FAA will help determine an ultimate location for the ASR.

It is recommended that the ATCT be relocated to address Hot Spot issues, and that the ASR be relocated within the airfield to allow for a more appropriate use of the land where it currently resides.

Airfield Maintenance Facility

The Airport's existing maintenance facility is located near the Airport's western boundary, south of the Westside Development Area. This facility includes five separate buildings that serve as airport vehicle maintenance and storage facilities. Collectively, these buildings comprise approximately 50,000 square feet of indoor space. There is additional outdoor space used for vehicle storage. It is surrounded by non-aviation related development and the location of this facility does not provide efficient access to the airfield and is over capacity

The construction of a new maintenance facility, located on a new site with improved airfield access, is recommended. It should be noted that the Airport's Snow Removal Equipment (SRE) and airfield maintenance equipment should be maintained and stored here. The existing maintenance facility could be removed or used for an alternate purpose.

FAA design standards include guidance on the layout and space required for consolidated airport maintenance and equipment storage facilities, contained in FAA AC 150/5220-18. A consolidated airport maintenance facility based on FAA standards and equipment currently used by COS calls for a total building size of at least 62,000 square feet. A recommended location and layout of future facilities, based on Airport management input, is shown in the following chapter.

It is recommended that the existing airfield maintenance facility be relocated and enlarged into a consolidated airfield maintenance and storage facility.

Emerging Technologies

There is significant focus on emerging technologies within the aviation industry. Advanced Air Mobility (AAM) is defined by the National Aeronautics and Space Administration (NASA) as "an air transportation system that moves people and cargo between places previously not served or underserved by aviation – local, regional, intraregional, urban – using revolutionary new aircraft that are only just now becoming possible." While AAM supports the transportation of people and goods between many geographic areas, Urban Air Mobility (UAM) focuses specifically on urban and suburban environments. The FAA envisions UAM as a "safe and efficient aviation transportation system that will use highly automated aircraft that will operate and transport passengers or cargo at lower altitudes within urban and suburban areas."

UAM is widely seen as the largest component of AAM and the one that has received the largest investment to date. Beyond UAM, AAM would incorporate use cases outside of urban environments, including commercial inter-city, cargo delivery, public services, and private vehicle travel. Both concepts include not only the aircraft themselves but also the framework for operation, access to airspace, infrastructure, and engagement with community members.

This transformative airborne technology is focused is on commercial passenger-carrying electric vertical takeoff and landing (eVTOL) aircraft and their support systems. eVTOL is the most discussed and reported segment of AAM to date. Innovations in distributed electric propulsion systems, electronic controllers, and battery systems have made this type of aircraft possible, which represents a move from a single rotor to multiple that increases handling and safety. With zero source emissions, they are more environmentally friendly.

eVTOL aircraft have numerous motors and propellers or rotors that propel the aircraft vertically and horizontally. Designs differ substantially among developers, with some aircraft featuring wings with propellers for horizontal flight and rotors for vertical flight and others featuring rotors alone for both vertical and horizontal flight. There are three main types of eVTOL systems that can be expected in significant volume if the eVTOL original equipment manufacturers (OEMs) deliver on their promise of safe, efficient, and cost-saving aircraft:

Multicopter – looks and flies much like a helicopter except with multiple rotors.

Lift and cruise – uses rotors for vertical flight and transitions to propellers for horizontal flight.

Vectored thrust – uses rotors or fans for both vertical and horizontal flight.

Most eVTOL OEMs currently seeking FAA certification are doing so in the small aircraft category (i.e., less than 12,500 pounds). The certification process involves a review of the proposed aircraft design, ground tests, and flight tests to demonstrate safety, an evaluation of the aircraft's required maintenance and operation suitability, and collaboration with other civil aviation authorities.

At the beginning of 2021, the Vertical Flight Society eVTOL Aircraft Directory included over 500 entrants to the electric and hybrid-electric vertical takeoff and landing market. The certification process involves a review of proposed designs, methods used to show the designs, and overall compliance with FAA regulations. The process also includes ground tests, flight tests, and an evaluation of the aircraft's required maintenance and operational suitability. Because this process is arduous and time-consuming, only a small percentage of these will likely achieve FAA certification. FAA aircraft certification procedures include three separate approvals that the eVTOL OEMs will need to achieve:

1. Type certification – approval of the aircraft design and all its component parts.

2. Production certification – approval to manufacture duplicate products under the approved design, which includes approval of the manufacturing facilities, personnel, and quality control systems.

3. Airworthiness certification – approval to operate the aircraft.

As of January 2022, no eVTOL aircraft had received FAA's type certification. While the timeline for certification of these aircraft is fluid, many OEMs are optimistic for entry into service in the U.S. as early as 2024. For COS, this segment of the aviation market represents a unique opportunity and one that the Airport may certainly want to be a part of. This may bring added passenger, cargo, and maintenance activity to the Airport which could call for additional apron space, electrical capacity, and airspace considerations.

Emerging technologies are rapidly developing. COS should continue to monitor it and prepare to respond appropriately when things are more definitive, and opportunities present themselves. Developing and maintaining apron, electrical and airspace capacity will be important to COS in playing a key role in this new aviation business environment.

Facility Requirements Summary

A summary of the facility improvements that need to be addressed during the planning period is provided below in **Table 4-29**. Selected improvements will be examined further in Chapter Five, *Alternatives Analysis & Development Plan***,** to create and evaluate options to accommodate these facility requirements.

Table 4-29: Facility Requirements Summary

Facility	Identified Requirement
Airfield Facility Requirements	
Airfield Demand Capacity	- No action required
Airport Design Standards	- Decouple Runway 17R-35L from Runway 13-31
Runways	- Decouple Runway 17R-35L from 13-31, extend Runway 35L south
Taxiways	- Separate Taxiway A from Runway 17R-35L to 500 feet - Shift high-speed exit Taxiway E4 - Realign a short section of Taxiway B - Reconfigure taxiways to Runway 17R and 13 with runway decoupling - Realign taxiway connectors with Taxiway A separation
Airfield Pavement	- No action required
Airport Visual Aids	- No action required
Navigational Aids (NAVAIDS)	- MALSR or ALSF-2 approach lighting system on Runway 35R
Obstruction Removal	- Recommendations to be incorporated into the ALP set
Airfield Marking, Lighting, Signage	- No action required
Passenger Terminal Requirements	
Terminal Space	- Reallocation of interior space to meet intermediate demands - Ultimate terminal expansion
Gates	- No intermediate requirements - Expansion of additional gates for ultimate development
Terminal Area Apron	- Development of deicing aprons to make room on existing apron
Auto Parking and Rental Car	- Develop CONRAC to add short-term parking capacity - Develop long-term/economy parking lot(s)
General Aviation and Cargo Requirements	
FBO	- Preserve space for FBO expansion
Corporate Aviation	- Additional corporate and maintenance hangar facilities
Aircraft Storage	- Expand apron in Westside Development Area consistent with GA Area Plan. In-fill and hangar expansion throughout Westside Development Area
Cargo	- Expand air cargo building and apron areas
Support Facility Requirements	
Regional Transportation Access	- Recommendations provided in Regional Transportation Access Study, see appendix
General Aviation Fuel Storage	- Construct consolidated general aviation fuel farm in Westside Development Area
Deicing Operations	- Construct deicing apron on east and make use of expanded west apron developed for deicing when needed on that side of airfield
ATCT / ASR	- Relocate ATCT and ASR, coordinate with FAA
Airfield Maintenance Facility	- Relocate existing maintenance facility to a larger consolidated maintenance/storage facility
Emerging Technologies	- Develop and maintain apron, electrical and airspace capacity to accommodate new technologies

Source: Jviation

5. Alternatives Analysis & Development Plan

Introduction

Airfield and landside development alternatives are identified for COS in this Master Plan based on the analyses completed in Chapter Four, *Demand/Capacity & Facility Requirements*. This chapter examines alternative development concepts and uses evaluation criteria to select a preferred development scenario to meet identified facility requirements in each of the following Airport functional areas:

- Airfield
- Passenger Terminal
- Automobile Parking and Rental Car
- Westside Development Area
- Airport Traffic Control Tower (ATCT)
- Airport Surveillance Radar (ASR)/East Deicing Apron
- Consolidated Airfield Maintenance/East Hangar Development

The order with which the development alternatives are evaluated reflects the need to implement an integrated development plan for the Airport's various facilities. The development of the airfield may impact development of general aviation, air cargo, and aviation support facilities which, in turn, must synchronize with the Airport's access and parking infrastructure.

Evaluation of Alternative Development Scenarios

A set of evaluation criteria was established to facilitate the selection of preferred development scenarios. These criteria will be used to compare and contrast the potential benefits and impacts of the alternative development incorporated into the selection process. The evaluation criteria include the following selections:

Safety/Operational Factors – Each alternative is evaluated on its ability to safely accommodate future demand for aircraft, vehicles, and other relevant traffic (based on each specific facility). This criterion evaluates an alternative's anticipated improvements to operational safety, capacity, and delay; tenant and user convenience; and other relevant planning considerations.

Economic Factors – Economic factors—historic infrastructure investment, the remaining useful life of existing Airport facilities, anticipated "order of magnitude" project costs, and property acquisition requirements—are considered in this analysis. These factors provide a basis for comparing the cost-effectiveness and economic ramifications of various development scenarios.

Environmental Factors – Relevant environmental factors including, but not limited to, noise, wetland, and contamination impacts, contribute to this analysis. These factors illustrate a scenario's environmental impacts and identify those that may minimize environmental disruptions.

Implementation Feasibility – Qualitative and quantitative factors can impact an airport's ability to implement certain development schemes. Community and political acceptance are examples of implementation feasibility factors considered in this analysis.

Alternative development scenarios are evaluated based on these factors. The results highlight preferred development alternatives that satisfy the previously specified facility requirements. Recommendations for development will be illustrated on the Airport Layout Plan (ALP) as part of this Master Plan.

Airfield

The facility requirement analysis examined the potential need for airfield development projects to enhance the Airport's ability to safely and efficiently accommodate current and projected activity. Key considerations in that analysis included airfield capacity and congestion, design standards and other safety issues, and facilities and equipment providing navigational and visual aid.

Airfield facilities deemed sufficient in Chapter Four are only addressed in this chapter if future airfield development could impact their ability to accommodate activity through the planning period. The following sections examine specific requirements identified for each of these facilities, the findings and recommendations of related previous analyses, and potential new development options to identify a preferred airfield development scenario.

Runway and Taxiway System

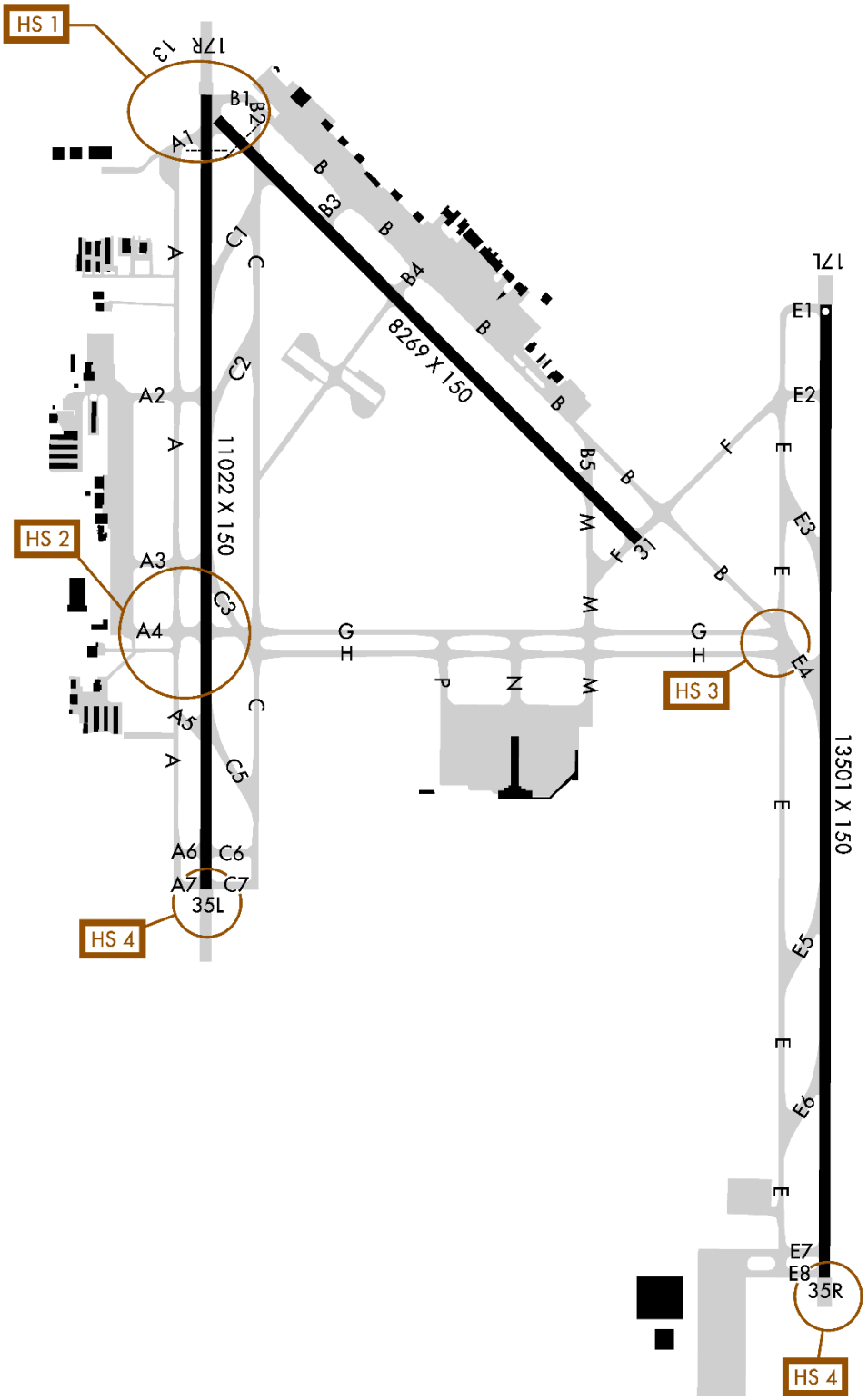
Chapter Four examined the ability of the Airport's existing runway and taxiway system to accommodate projected levels of activity through the 20-year planning period. The results indicated that the existing airfield configuration provides sufficient capacity to efficiently accommodate aircraft operational demand through the planning period. The Airport's estimated airfield demand/capacity ratio is not projected to reach the key benchmarks that would demand enhanced capacity.

As shown in Chapter Three, *Aviation Activity Forecast*, because the use of narrowbody and large jets will continue to grow at COS, the demand for the necessary facilities will also continue to grow. The runway and taxiway system at COS was designed to accommodate these aircraft while still servicing smaller aircraft. The popularity of regional and narrowbody jet aircraft among domestic air carriers may drive increased jet traffic at the Airport. Despite the projected increased traffic, the existing runway and taxiway system should be maintained to existing standards to serve air traffic.

The previous Master Plan, completed for COS in 2013, reached similar conclusions. The 2013 airfield development scenario included shifting and extending Runway 17R-35L to increase the overall length by 710 feet to efficiently accommodate projected activity while addressing Hot Spot #1 (Runway 17R-35L coupled with Runway 13-31). In addition, the 2013 plan called for the relocation and displacement of the Runway 13 threshold, effectively shortening the runway by 400 feet. The 2013 recommended airfield development scenario was re-evaluated in this Master Plan.

The findings and recommendations of the Airport's 2013 Master Plan, as it pertains to the runway and taxiway system, are summarized in the following section. On the following page, a simplified airport diagram is provided for referencing the airport layout as well as the runway and taxiway systems.

Figure 5-1: Simple Airport Diagram



2013 Master Plan

The Airport's 2013 Master Plan evaluated facility requirements and selected an airfield development concept that addressed demand and design issues. Some airfield facility requirements identified in the 2013 plan continue to be relevant considerations for future Airport development. Below is a summary of airfield recommendations from the 2013 Master Plan:

- Relocating the threshold and associated taxiways for Runway 17R 1,790 feet south and demolishing the remaining pavement before the threshold. Extending the Runway 35L end and associated taxiways 2,500 feet south.

- Constructing a parallel taxiway (shifting existing Taxiway A west 100 feet) for Runway 17R-35L with a runway/taxiway separation of 500 feet to serve large aircraft. Removal of segments of existing Taxiway A.

- Relocating high-speed exits off Runway 17R-35L connected to Taxiway C, positioned relative to the shifted runway. The High-speed exits require additional modifications:

    - Relocation of high-speed exit C1 approximately 3,300 feet south to provide an ideal aircraft exit location relative to the runway shift—effectively removing C1 and constructing a new exit south of C2.

    - Closure of high-speed exit C3 to address multiple converging taxiways associated with Hot Spot #2.

    - Development of a new high-speed exit near the existing Runway 35L threshold. This will provide an ideal aircraft exit location relative to the southern runway shift.

- Relocating high-speed exit E4 serving Runway 17L-35R and Taxiway E. The high-speed exit will be shifted 1,700 feet south of its current location to address multiple converging taxiways associated with Hot Spot #3 and to provide an ideal aircraft exit location.

- Constructing runway end entrance, exit, and bypass taxiway connectors on both ends of Runway 17R-35L associated with the runway shift as well as a new bypass connector serving Runway 17L. This change will provide runway end entrance, exit, and bypass taxiway connectors on the parallel runways.

- Demolishing and constructing various taxiway connectors to improve consistency with taxiway design principals and address Hot Spots related to taxiway congestion and confusion. This includes modification to the following taxiway connectors:

- Closure of A1 with Runway 17R threshold relocation
- Relocate A2 to avoid direct apron-to-runway access
- Modify A3 and A4 to avoid direct apron-to-runway access
- Given removal of some taxiway connectors and to enhance aircraft flow to the general aviation (GA) apron and Taxiway A, construct a high-speed exit for aircraft landing on Runway 17R near A3
- Realign the end of Taxiway B with its connection to Taxiway E to address multiple converging taxiways associated with Hot Spot #3

The findings and recommendations from the 2013 Master Plan for airfield enhancements related to Runway 17R-35L and 17L-35R have been reevaluated in this Master Plan. Recommended projects related to Runway 17L-35R and associated taxiways are carried forward in this and onto the Airport Layout Plan. Similarly, the recommended project to shift Taxiway A with a 500-foot separation from Runway 17L-35R is reasonable, follows FAA design guidelines and is carried forward in this Master Plan.

This Master Plan further studies requirements to shift Runway 17R-35L south and decouple it from Runway 13-31. An investigation of the geotechnical and subsurface factors associated with extending Runway 35R is a key element of the final design. Although a detailed investigation and survey is not included in this Master Plan, some research of the existing surface and subsurface conditions will inform future cost assessments. Cost estimates to extend the runway will be developed.

Airfield Safety Areas

The 2013 study examined various alternatives to address compliance issues with the Runway Protection Zone (RPZ) and Runway Safety Area (RSA) for Runway 13. The study noted that the RPZ for Runway 13 had a road passing through it and called for the road to be relocated or the runway end shifted. The study also called for a runway shift to rectify the non-standard condition of the RSA off the end of Runway 13. The resulting recommendation reduced the runway length by 400 feet and displaced the Runway 13 threshold by 510 feet.

The recommendation from the previous Master Plan was reevaluated. With the shift of Runway 17R-35L to the south, the RSA for Runway 13 follows FAA design standards and does not require a shift. It was also determined that the current RPZ issue does not require a runway shift or road relocation. The FAA's land use guidance related to RPZs calls for compliance if/when the location and/or size of the RPZ changes. The road within the current RPZ is effectively "grandfathered" with previous RPZ guidance and does not require a shift of the Runway 13 threshold. Given these factors, changes to the Runway 13-31 length and

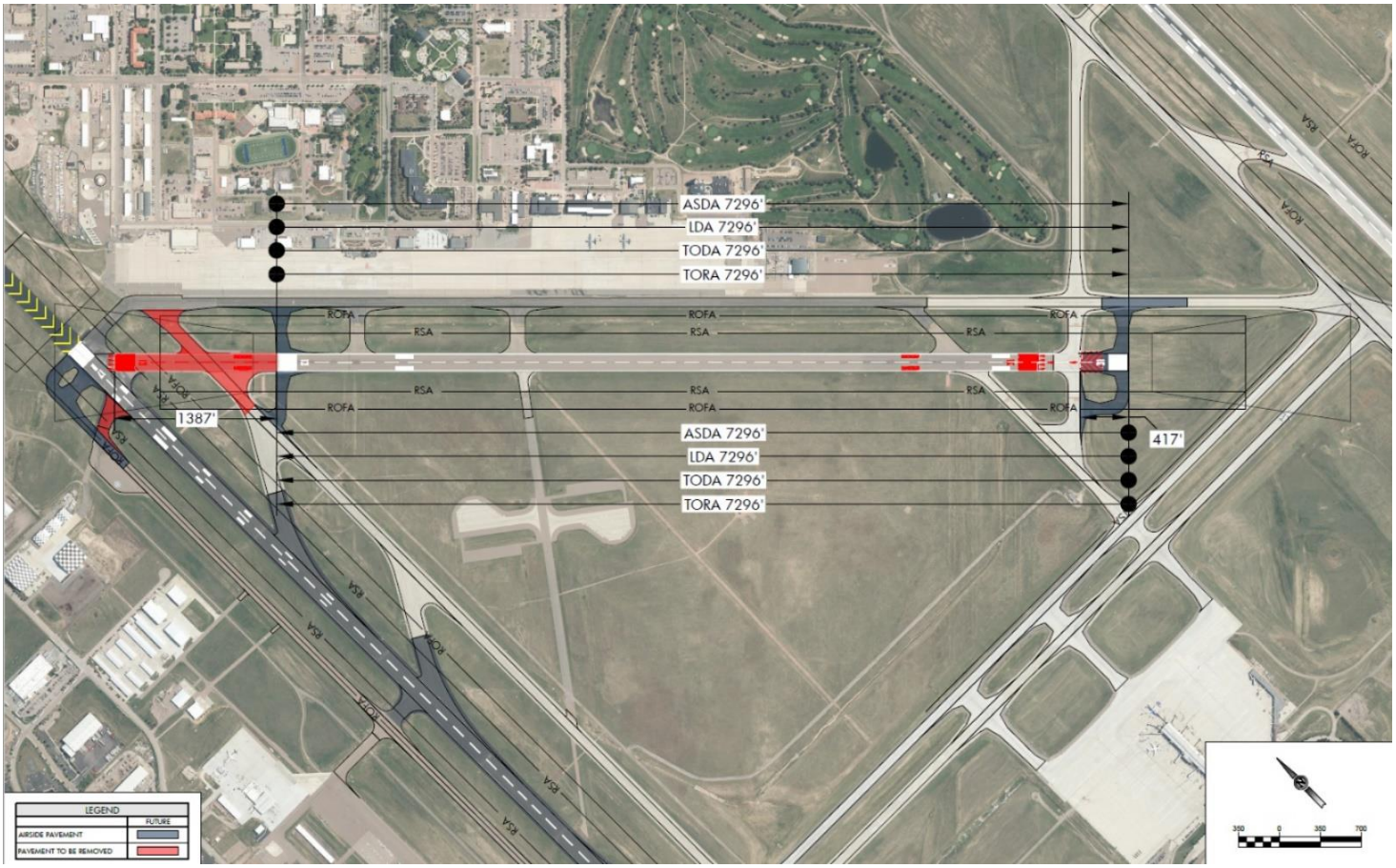
thresholds, as depicted in the 2013 Master Plan, are not required or recommended in this Master Plan.

This Master Plan provides the opportunity to reevaluate the recommendations made in the 2013 Master Plan and look for ways to meet design standards with potentially more cost-effective solutions. The option to address the Hot Spot #1 (HS 1) coupled runway issue by shifting Runway 13-31 and not shifting runway 17R-35L (as recommended in the 2013 Master Plan) was reexamined.

Runway 13-31 Alternative #1

The first Runway 13-31 option to address HS 1 was to shift the Runway 13 threshold 1,387 feet east to separate the RSA for Runway 13-31 from Runway 17R-35L while maintaining a 1,000-foot RSA. Runway 31 is extended 417 feet east to provide additional length while maintaining a 1,000-foot RSA. This effectively creates a standard runway configuration without the use of declared distances and produces a runway length of 7,296 feet. Runway 17R-35L is not shifted in this solution. **Figure 5-2** illustrates this alternative and includes associated taxiway improvements.

Figure 5-2: Runway 13-31 Alternative #1

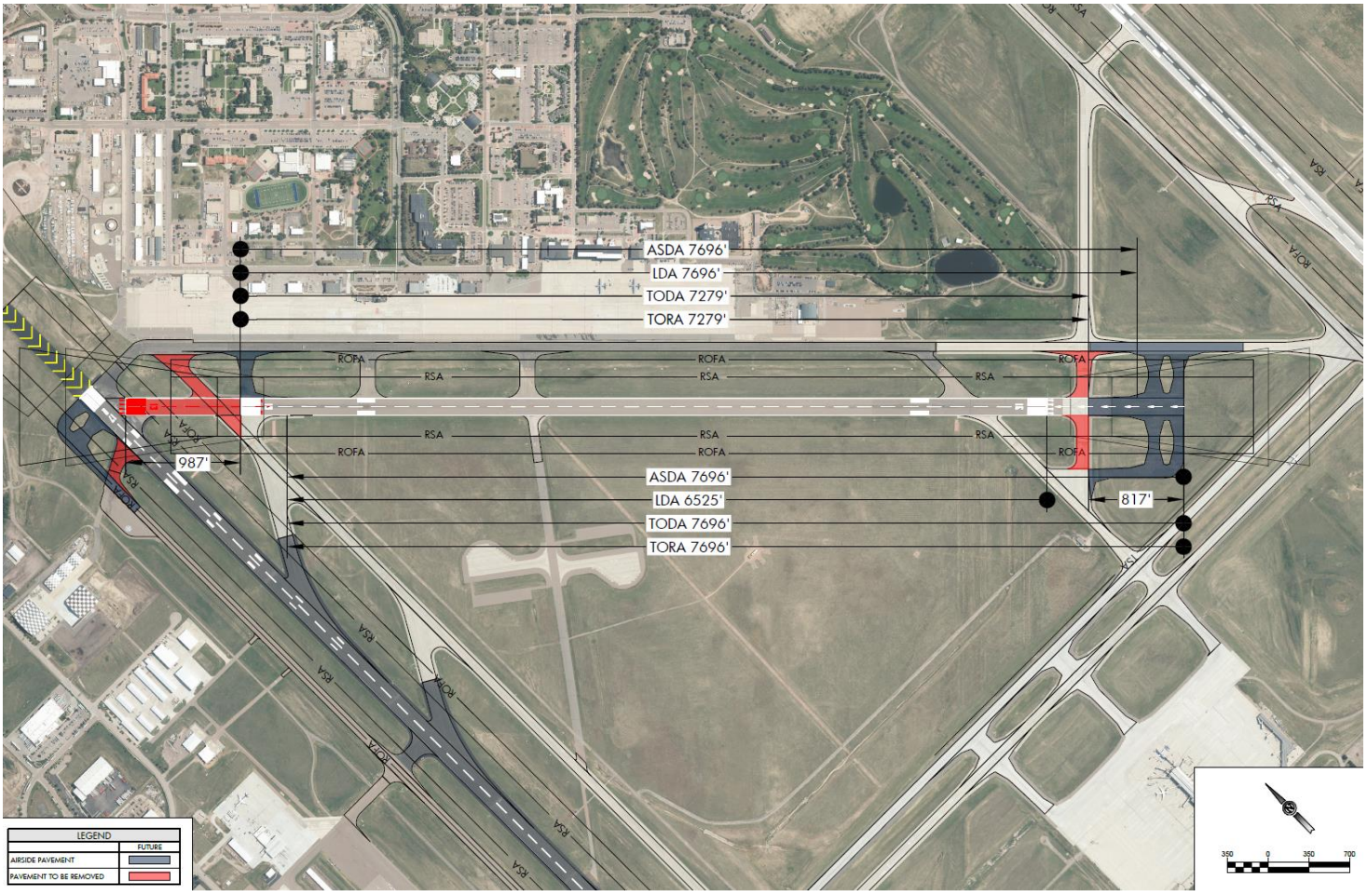


Source: Jviation

Runway 13-31 Alternative #2

The second Runway 13-31 option to address HS 1 was to shift the Runway 13 threshold 987 feet east and extend the Runway 31 end by 817 feet. This option employs the use of declared distances that require a 600-foot RSA prior to the landing threshold and 1,000-foot RSA beyond the runway departure end. Additionally, this alternative maintains the Runway 31 threshold in its current location and positions the takeoff point for departures on Runway 13 in a location that retains the existing approach and departure surface locations. This option creates various takeoff and landing lengths used in declared distances to meet design standards while extending usable runway length. Similar to Alternative #1, Runway 17R-35L is not shifted in this solution. **Figure 5-3** illustrates this alternative and includes associated taxiway improvements.

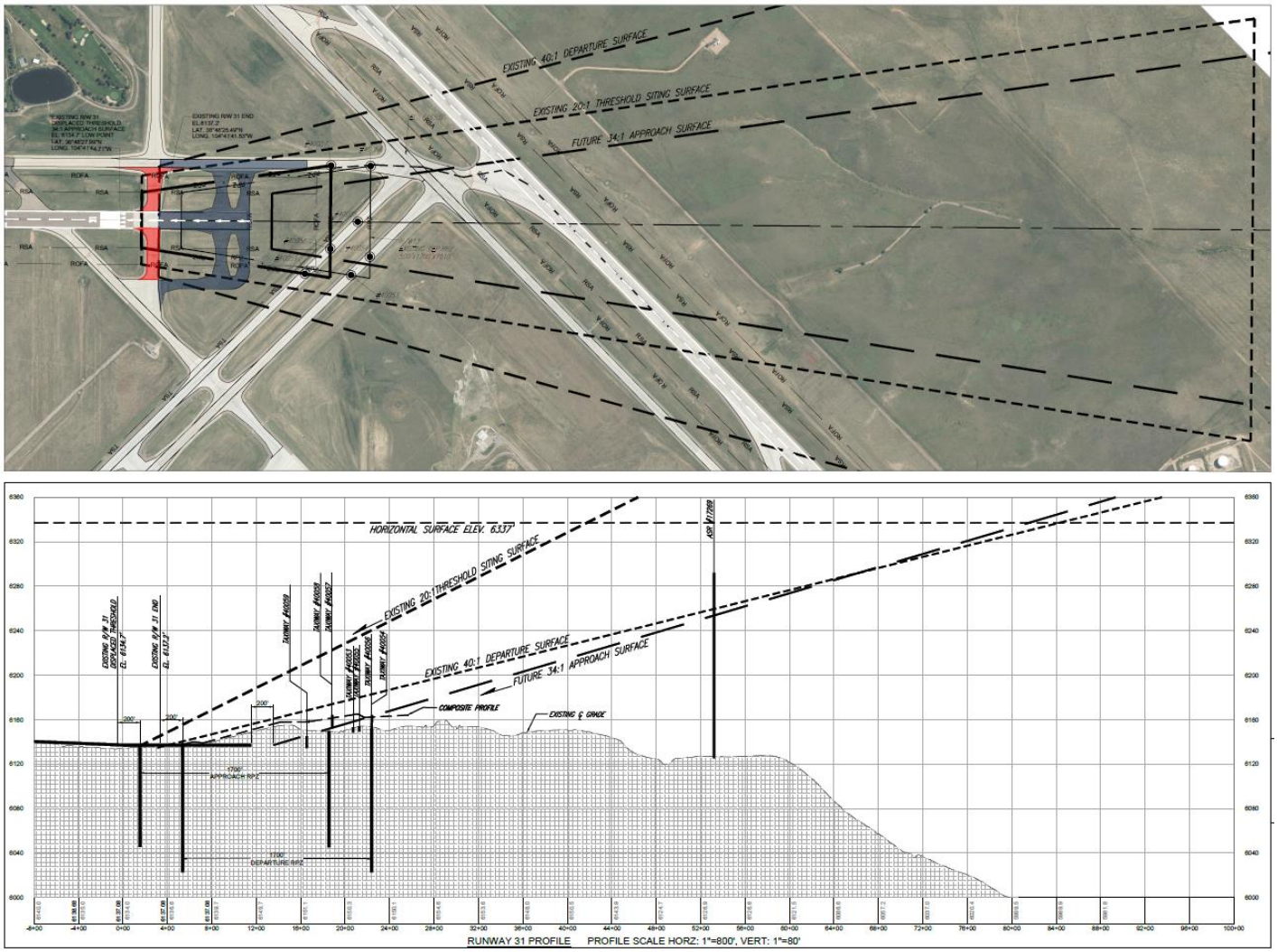
Figure 5-3: Runway 13-31 Alternative #2



Source: Jviation

Runway 13-31 Alternative #2, is the preferred option to address HS 1 because it does not require a shift in Runway 17R-35L (far more costly), provides greater takeoff length from Runway 31 than Runway 13-31 Alternative #1, and maintains existing approach and departure slopes on the Runway 31 end **(Figure 5-4**).

Figure 5-4: Runway 31 Alternative #2 Profile

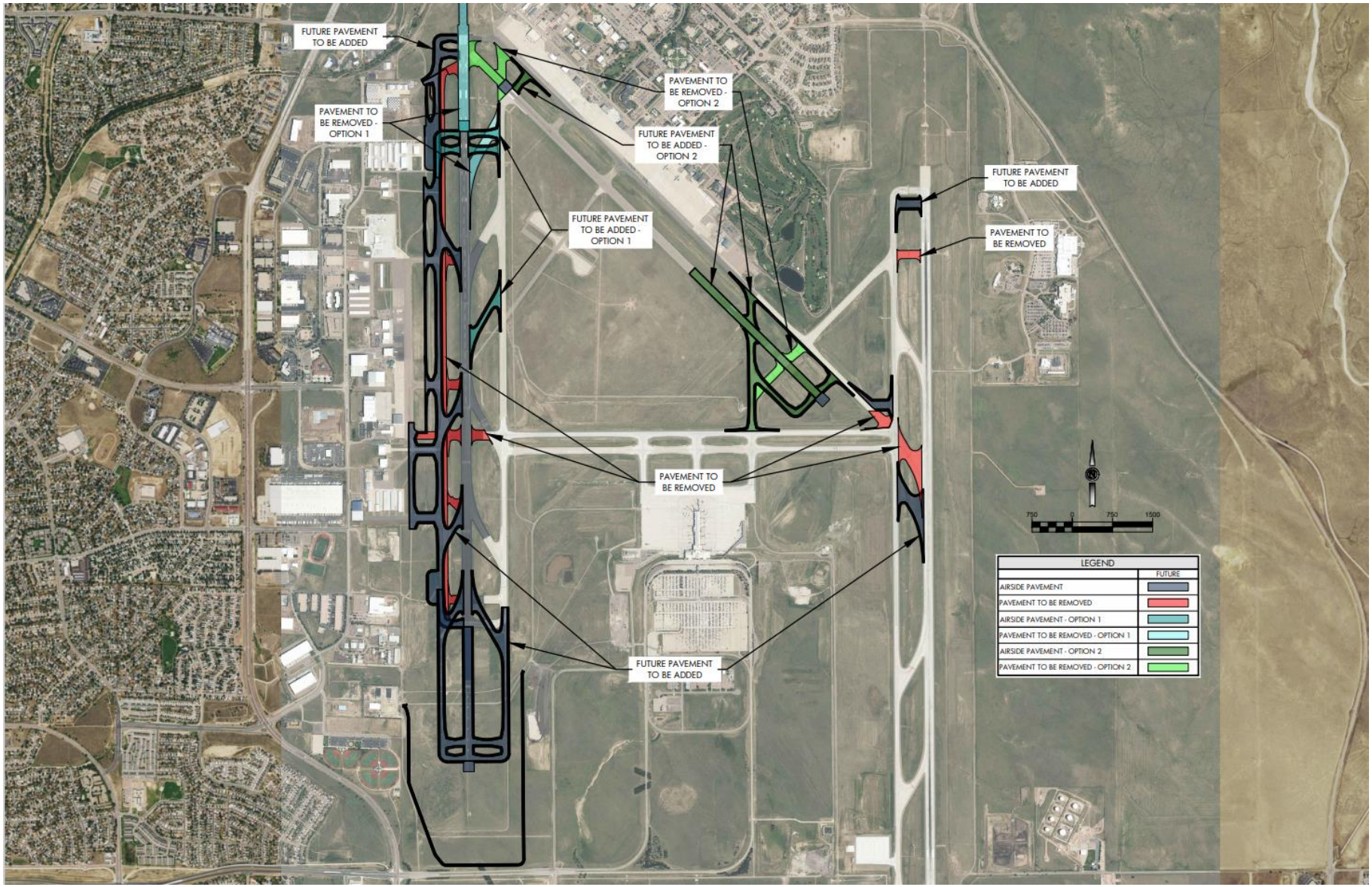

EXISTING 40:1 DEPARTURE SURFACE
EXISTING 20:1 THRESHOLD SITING SURFACE
FUTURE 34:1 APPROACH SURFACE
HORIZONTAL SURFACE ELEV. 6337'
EXISTING 20:1 THRESHOLD SITING SURFACE
EXISTING 40:1 DEPARTURE SURFACE
FUTURE 34:1 APPROACH SURFACE
COMPOSITE PROFILE
EXISTING 6 GRADE
RUNWAY 31 PROFILE
PROFILE SCALE HORZ: 1"=800', VERT: 1"=80'

Source: Jviation

The decoupling of Runway 17R-35L from Runway 13-31 creates an opportunity to improve efficiency and aircraft flow by modifying the runway end entrance, exit, and bypass taxiway connectors serving the runways. On the Runway 13 end, pavement prior the Runway 13 threshold will be removed to simplify movement paths At Runway 31, existing connectors will be abandoned, and new connectors added to the extended runway end. These improvements will simplify the taxiway layout, reduce possible confusion, and enhance aircraft flow. The grade of the Runway 31 will be adjusted to meet design standards.

Figure 5-5 illustrates options to address HS 1, with Option 1 being to shift Runway 17R-35L as presented in the previous master plan and Option 2 being to shift Runway 13-31 as presented above. Both these options require additional study to determine a preferred solution. After discussion with COS and the FAA, the recommendation is to illustrate both of these options on the ALP and evaluate them further to include survey and design to lead to a preferred option.

Figure 5-5: Airfield Development Plan


FUTURE PAVEMENT TO BE ADDED
PAVEMENT TO BE REMOVED - OPTION 1
PAVEMENT TO BE REMOVED - OPTION 2
FUTURE PAVEMENT TO BE ADDED - OPTION 2
FUTURE PAVEMENT TO BE ADDED - OPTION 1
FUTURE PAVEMENT TO BE ADDED
PAVEMENT TO BE REMOVED
PAVEMENT TO BE REMOVED
FUTURE PAVEMENT TO BE ADDED
750 0 750 1500
LEGEND
FUTURE
AIRSIDE PAVEMENT
PAVEMENT TO BE REMOVED
AIRSIDE PAVEMENT - OPTION 1
PAVEMENT TO BE REMOVED - OPTION 1
AIRSIDE PAVEMENT - OPTION 2
PAVEMENT TO BE REMOVED - OPTION 2

Source: Jviation

Passenger Terminal

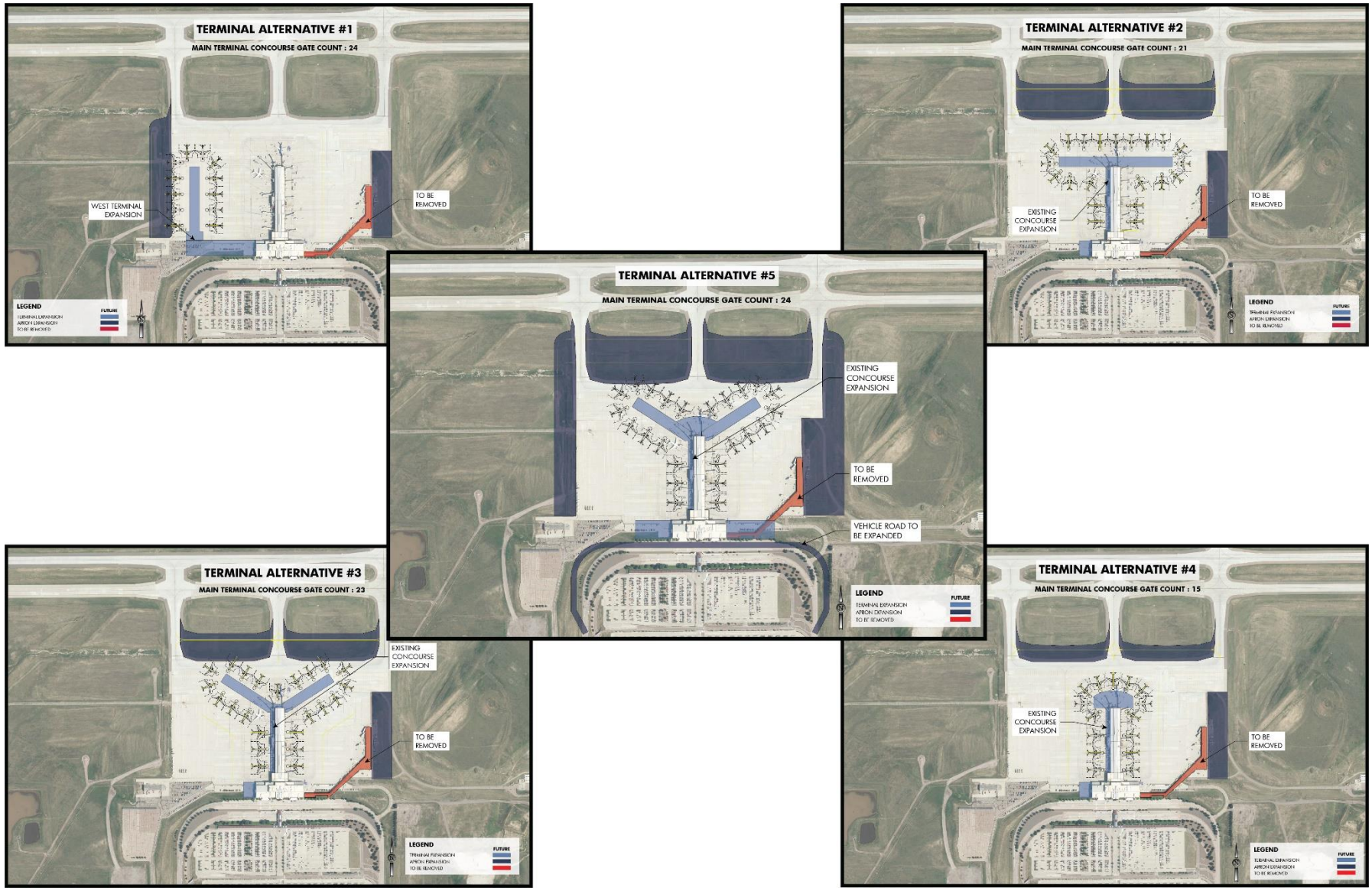
Chapter Four, *Demand/Capacity & Facility Requirements,* identified a long-term need to expand the overall terminal building to accommodate air carrier passenger levels once they begin to approach 1.6 million annual enplanements—identified as Passenger Activity Level (PAL) 4. The expansion of the terminal building would increase space for passenger circulation, security screening, concessions, gates, and other functional areas. Interim improvements before overall terminal expansion may be necessary to accommodate short-term demands. Baggage system, passenger screening and other areas of the terminal may be required before large scale capacity enhancements are made.

A series of terminal development options review possible modifications to the existing terminal that would accommodate long-term demands. The complete redevelopment of the terminal building, including demolition of the entire existing terminal, was not studied as many portions of the existing terminal are viable and well within their useful life.

It is important to note that these options are simple terminal layouts that provide a high-level perspective of overall building, gate, and apron space. As passenger volume increases and the Airport seeks ways to expand the terminal, a more thorough terminal capacity and design effort should be undertaken to determine the best plan for COS. The preferred option shown within this Master Plan is intended to preserve the Airport's ability and interest to carry out such a future evaluation. **Figure 5-6** illustrates four terminal building expansion alternatives to accommodate a greater level of passenger activity than today.

Following the graphic, each alternative is summarized and evaluated, followed by a recommendation.

Figure 5-6: Terminal Development Alternatives



Source: Jviation

Passenger Terminal Alternative Descriptions

Terminal Alternative 1 – This alternative effectively doubles the size of the existing terminal by adding and connecting another full-length concourse. This produces a total count of 24 narrowbody main terminal gates (not including the East Terminal Unit). Additional apron space is added to the western edge of the existing apron to provide adequate aircraft pushback and movement area. This alternative would require an additional TSA checkpoint at the beginning of the new concourse.

Terminal Alternative 2 – This alternative extends the concourse to create a T-shaped design to utilize existing apron space and terminal infrastructure. The existing terminal and concourse are widened to provide more circulation, concession, and holdroom space leading to the additional gates. This alternative produces a total of 21 narrowbody aircraft gates within the main terminal concourse. This alternative removes the East Terminal Unit and expands the apron area east to allow for more aircraft and ground service equipment movement, staging, and parking. The apron is also expanded to the north with two taxilanes running east/west, providing air carrier aircraft with multiple taxi routes to access gates.

Terminal Alternative 3 – This alternative extends the concourse to create a Y-shaped configuration intended to utilize the depth of the existing apron space. In this alternative, the existing terminal and concourse are also widened to provide more circulation, concession, and holdroom space leading to the additional gates. The Y-shaped design promotes a centralized concession area where the three legs converge. This alternative produces a total of 23 narrowbody aircraft gates within the main terminal concourse and removes the East Terminal Unit to expand the apron area east to allow for more aircraft and ground service equipment movement, staging, and parking. In addition, the apron is expanded to the north with one taxilane running east/west to allow for adequate aircraft pushback and circulation.

Terminal Alternative 4 – This alternative creates a rounded-end at the end of the existing concourse, creating additional gates, a centralized holdroom, and a concession area. The existing terminal and concourse are widened to provide more circulation, concession, and holdroom space leading to the additional gates. This alternative produces a total of 15 narrowbody aircraft gates within the main terminal concourse. This alternative removes the East Unit Terminal as additional apron area used for aircraft and equipment movement, staging and parking. The apron is expanded to the north, with one taxilane running east/west, to allow for adequate room aircraft pushback and circulation off the end of the concourse. This alternative could be viewed as a preliminary phase of expanding the concourse further in the T or Y configuration, as noted in the previous two alternatives.

Terminal Alternative 5 – This alternative is created by combining Alternatives 3 and 4 noted above. The configuration could be completed into two stages with the rounded-end completed first, then the Y-shaped added as demand increases, or completed all at once. This alternative creates a rounded-end at the end of

the existing concourse, creating additional gates, a centralized holdroom, and a concession area as well as a Y-shaped configuration intended to utilize the depth of the existing apron space and provide a total of 24 gates. The East Unit Terminal is removed, and the apron is expanded on both the east and west to provide double width taxilanes to all gates as well as additional apron space for aircraft and equipment movement, staging and parking. The apron is also expanded to the north with two taxilanes running east/west, providing aircraft with multiple taxi routes to access gates.

Passenger Terminal Alternative Evaluation

The matrix presented in **Table 5-1** compares each alternative with respect to the evaluation criteria. To measure and rank the quantitative and qualitative impacts associated with each alternative, a value range of 1 to 5 was assigned to each evaluation criterion. A value of 1 represents the least benefit, and a value of 5 represents the most positive impact or provides greater benefit. It must be noted that this evaluation is non-scientific and is based on an understanding of the Airport, community, and industry standards.

Table 5-1: Passenger Terminal Alternatives Evaluation Matrix

Alternatives	Safety/Operations	Economic	Environmental	Implementation	TOTAL
Alternative 1	1	2	3	4	10
Pros	Doubles main terminal gate count, minimal disruption to existing operation during construction.				
Cons	Requires extensive existing apron space, congested taxilanes to concourses, requires two screening stations, costly.				
Alternative 2	3	3	3	2	11
Pros	Significant gate capacity, consolidated screening, promotes centralized concessions at center of T, provides additional apron space.				
Cons	Taxilane congestion off ends of T, major disruption to existing operation during construction, costly.				
Alternative 3	4	3	3	2	12
Pros	High gate capacity, consolidated screening, promotes centralized concessions at center of Y, produces additional apron space.				
Cons	Taxilane congestion off ends of Y, major disruption to existing operation during construction, costly.				
Alternative 4	5	4	3	3	15
Pros	Consolidated screening, promotes centralized concessions at end of concourse, utilizes existing apron with little expansion required, consistent with expected gate demand (cost effective), allows for additional long-term expansion in other areas.				
Cons	Adds fewest number of gates, moderate disruption to existing operation during construction.				
Alternative 5	5	5	3	5	18
Pros	Consolidated screening, promotes centralized concessions at end of concourse, utilizes existing apron, expanded apron for movement, staging and parking, consistent with expected gate demand (cost effective), allows for additional long-term expansion in other areas, promotes phasing development opportunities, no taxilane congestion, high gate count.				
Cons	Moderate disruption to existing operation during construction, costly				

Source: Jviation
Note: Criterion Scores Range: 1 = least benefit; 5 = Positive impact/most benefit

Pros and cons for each alternative are provided in the table above and explain the evaluation scores. Based on the evaluation, it is recommended that Alternative 5 be carried forward in the Master Plan and ALP set. As noted earlier, further study of the terminal capacity and design requirements should be undertaken when terminal expansion is initiated.

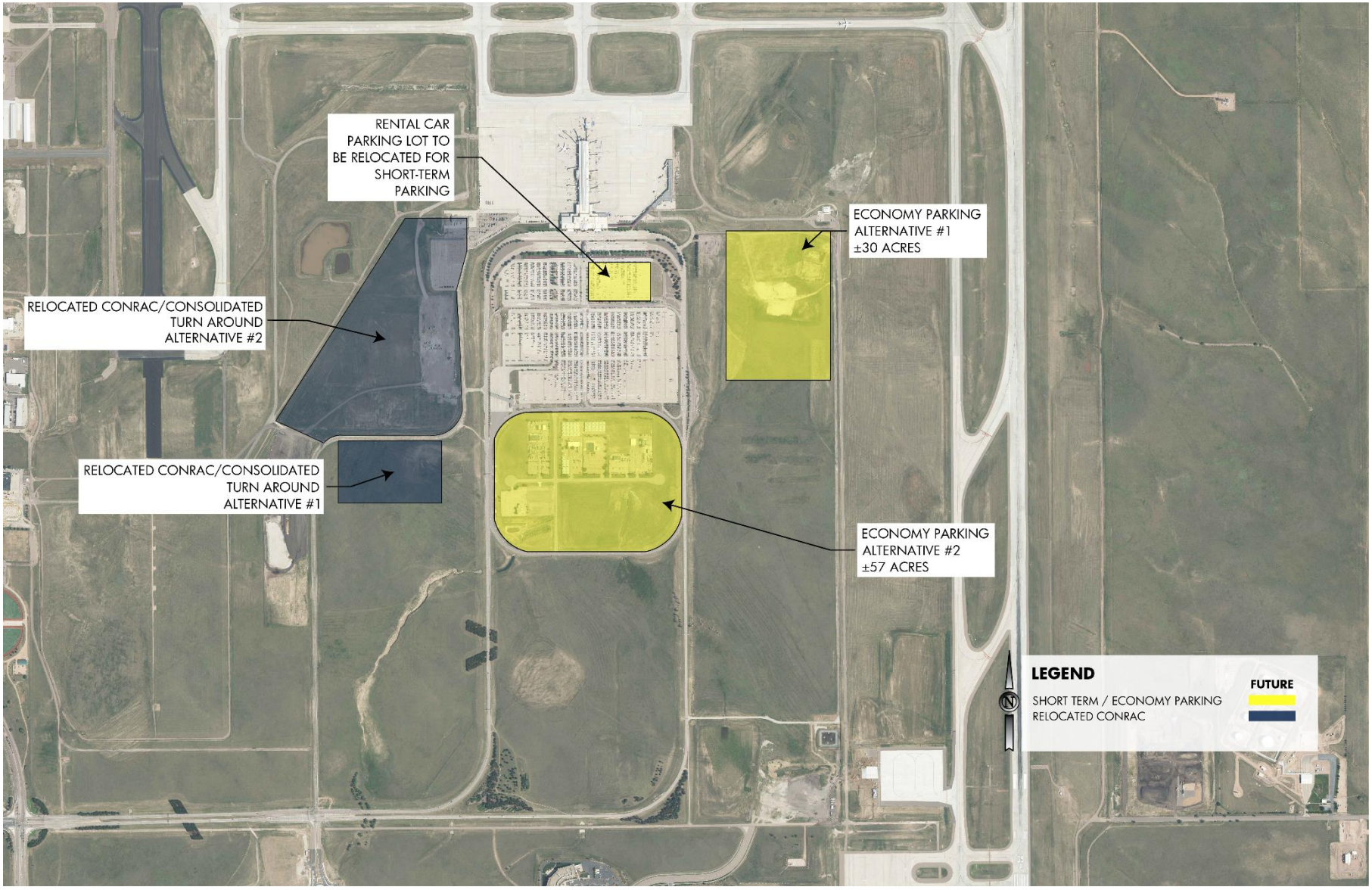
Automobile Parking and Rental Car

As noted in the previous chapter, automobile parking at COS is near capacity during peak periods of passenger activity. The short-term parking lot (7 acres) periodically reaches capacity, forcing visitors who would otherwise use short-term parking to park in the long-term lot. Consequently, long-term parking (34 acres) may reach capacity when short-term parking overflows or during holiday travel periods. The need for additional automobile parking will only increase as the number of passengers rise and commercial flights increase, further exacerbating the problem. Additional short and long-term parking areas will provide much needed capacity.

One remedy to address the need for short-term parking is to develop a consolidated rental car (CONRAC) facility. Locating the CONRAC facility away from current rental car parking and freeing the space for parking will effectively double short-term parking spaces and align the short-term parking lot closer to its intended purpose. Alternatives for CONRAC facilities are shown within the terminal area to promote passenger convenience and shorter travel distances. Many airports develop CONRAC facilities far from the terminal area to avoid congestion. At COS, however, there is abundant land near the terminal area for a CONRAC and other facilities that would benefit from a close connection to passenger activity.

A series of parking and rental car development alternatives were created to address existing and future parking capacity issues. These areas were studied together as they influence one another and could be partially consolidated. **Figure 5-7** shows a combined series of alternative options for multiple parking and CONRAC locations. A description of each alternative, an evaluation, and a recommendation follows.

Figure 5-7: Parking and CONRAC Alternatives


RENTAL CAR PARKING LOT TO BE RELOCATED FOR SHORT-TERM PARKING
ECONOMY PARKING ALTERNATIVE #1 ±30 ACRES
RELOCATED CONRAC/CONSOLIDATED TURN AROUND ALTERNATIVE #2
RELOCATED CONRAC/CONSOLIDATED TURN AROUND ALTERNATIVE #1
ECONOMY PARKING ALTERNATIVE #2 ±57 ACRES
LEGEND
FUTURE
SHORT TERM / ECONOMY PARKING
RELOCATED CONRAC
N

Source: Jviation

Parking Alternative Descriptions

The parking lots in the alternatives are further from the terminal than the long-term lot and may require shuttle service. Due to this distance, these lots could be considered "economy," a designation that would represent a third tier of parking at COS (short-term, long-term, and economy). This potential parking tier should be evaluated further to determine services, amenities, and costs associated with the lots.

Economy Parking Alternative 1 – This alternative adds parking east of the existing parking lots and is easily accessed by passengers as they approach the terminal. At 30 acres, this lot would almost double long-term parking capacity.

Economy Parking Alternative 2 – This alternative transforms the existing rental car turnaround facilities into a parking lot that measures approximately 57 acres. This lot could be accessed via current roadways and integrated with the existing parking pay stations.

CONRAC Alternative Descriptions

Alternatives for CONRAC development include the consolidation of all rental car functions at COS, including a ready/return lot; a building with rental agency counters, offices, and other facilities; and vehicle turnaround facilities. As mentioned earlier, the development of the CONRAC is recommended to realign the existing rental car ready/return lot to much needed short-term parking.

CONRAC Alternative 1 – In this alternative, the CONRAC is placed in between Milton Proby Parkway and Peak Innovation Parkway, directly west of the existing turnaround facilities. This lot would be accessed via Peak Innovation Parkway, keeping all rental car traffic off Milton Proby Parkway. An option to lower the size and costs for this alternative could be keep rental car turnaround facilities where they are currently located. This option would not allow for the existing rental car turnaround facilities to be converted to a parking lot.

CONRAC Alternative 2 – This alternative shows the CONRAC located west of, and relatively close to, the terminal building. A moving walkway would likely be utilized by passengers going to/from the terminal. In this alternative, the CONRAC would be accessed via Peak Innovation Parkway, keeping all rental car traffic separated from Milton Proby Parkway. The area shown in this alternative could accommodate rental car turnaround facilities, allowing for the conversion of the existing turnaround facilities to a parking lot.

Parking and CONRAC Alternative Evaluation

An evaluation of parking and CONRAC alternatives is presented in **Table 5-2.** This matrix compares and contrasts each alternative with respect to the evaluation criterion and evaluates the interrelationship between the two facilities to produce a recommendation that works best for both.

Table 5-2: Parking and CONRAC Alternatives Evaluation Matrix

Alternatives	Safety/Operations	Economic	Environmental	Implementation	TOTAL
Parking Alternative 1	3	4	3	4	14
Pros	Convenient location near terminal building, room for expansion, possible walkway option.				
Cons	Requires use of Milton Proby Parkway, users must pass terminal building after exiting the lot, disconnected from other lots, may require shuttle, may reduce long-term terminal area expansion (aeronautical uses).				
Parking Alternative 2	4	3	3	3	13
Pros	Can be connected to existing long-term lot for consolidated operation, possible walkway option.				
Cons	Requires reallocation of rental car turnaround facilities, may require shuttle option, requires use of Milton Proby Parkway.				
CONRAC Alternative 1	3	3	2	4	12
Pros	Reduced size configuration option with existing turnaround facilities in place, dedicated route on Peak Innovation Parkway.				
Cons	Further from terminal building than other alternative, requires shuttle ride and no opportunity walkway, cannot be used as flex space with parking.				
CONRAC Alternative 2	4	4	3	3	14
Pros	Convenient location near terminal building with passenger walkway, space for additional peak period parking demand (flex space), dedicated route on Peak Innovation Parkway.				
Cons	Requires reallocation of overflow lot, may reduce long-term terminal area expansion (aeronautical uses).				

Source: Jviation
Note: With respect to the criterion above, Range with 1 = least benefit; 5 = Positive impact/most benefit

Pros and cons for each alternative are included to explain evaluation scoring. Based on the evaluation, it is recommended that Parking Alternatives 1 and 2 and CONRAC Alternative 2 be carried forward in the Master Plan and ALP set. Both parking alternatives are recommended because they scored high and close to one other in the evaluation, are independent from one another, represent a valuable use for each area, and could each contribute to accommodating demand as the Airport grows. The phased development of Parking Alternative 2 is driven by the development of the CONRAC.

CONRAC Alternative 2 was chosen because of the convenient proximity to the terminal; employment of a passenger walkway (potentially in addition to shuttle); the use of Peak innovation Parkway for access; and the ability to share the flex space between parking and rental car needs. It is important to note that these options are simple high-level alternatives for parking and rental car components. The preferred options shown in the Master Plan are intended to preserve the ability to carry out future evaluation, which will also include consideration of public parking/rental car facilities.

Westside Development Area

The Westside Development Area, or General Aviation Area, of the Airport is home to many businesses, tenants, and users. This area has been redeveloped in the past and continues to expand to satisfy user needs. The previous chapter, the 2013 Master Plan, and the 2016 COS General Aviation Area Plan all define areas of expansion for the Westside Development Area. Key aspects of these studies have been incorporated into this plan:

- In-fill apron and hangar development intended to accommodate the growth in based aircraft as well as businesses using the Airport
- Apron expansion tied to the redevelopment of Taxiway A to better utilize space and accommodate more diverse aircraft
- Alternatives for a consolidated general aviation fuel farm to improve the efficiency and effectiveness of FBO fueling operations
- Westside aircraft apron parking, staging and deicing to accommodate the wide range of aircraft types using Runway 17R-35L

The areas to expand in the Westside Development Area, as well as alternative locations for the consolidated general aviation fuel fam, are illustrated **Figure 5-8**. Hangar, apron, and deicing locations were determined through a previous study and consultation with the Airport. The evaluation and recommendation of the consolidated general aviation fuel farm location is discussed below.

Figure 5-8: Westside Development Area

Source: Jviation

Three alternatives for a consolidated general aviation fuel farm were developed as part of this study. All alternatives are located on the Westside Development Area of the Airport with Alternative 1 located at the northernmost point, Alternative 2 located south of the World War II Aviation Museum, and Alternative 3 located central to the Westside Development Area and close to the Airport's FBOs. These alternatives were determined and evaluated with Airport operations and management staff.

Alternative 3 is the recommended location of the consolidated general aviation fuel farm. This recommendation is based on the central location on the Westside Development Area, proximity to the FBOs, and convenient landside and airside access. As the Airport works towards design and development of the facility, the FBOs should be engaged to determine overall capacity requirements and any special needs for the facility.

Airport Traffic Control Tower

Chapter Four noted the need to relocate the Airport's Airport Traffic Control Tower (ATCT). Relocation of the ATCT may be beneficial for several reasons:

- Improve line of sight to the existing airfield and address possible line of sight issues with the proposed shift of Runway 17R-35L.
- Address the two Hot Spots #4 which note that the approach ends of Runways 35L and 35R are very far from the ATCT and small aircraft near those locations may not be readily visible from the ATCT.
- Afford Peterson Space Force Base use of the existing ATCT facility or land for other purposes to carry out its mission.

Finally, the ATCT's new position should conform to airfield design standards. Ideally, a controller will look north for approaching/departing aircraft to avoid prolonged viewing into the sun so moving the ATCT from its current position will reduce southern exposure.

Figure 5-9 illustrates four alternative ATCT location sites. The graphic includes the recommended ATCT heights at each proposed location as well as the existing location, to maximize object discrimination and line of sight based on the FAA's Air Traffic Control Visibility Analysis Tool. A brief description, the benefits and challenges of each location, and a recommendation follow the illustration.

Figure 5-9: Airport Traffic Control Tower Alternatives

Source: Jviation

ATCT Alternative Descriptions and Evaluation

The application of ATCT siting principals generated four alternative locations. The planning effort used these principals as both guide and goalpost to determine ATCT location alternatives. The runways at COS are more than one mile apart, requiring a taller ATCT than airports with closely spaced runways.

ATCT Alternative 1 – This alternative places the ATCT at the corner of Peak Innovation Parkway as the road nears the terminal area. The height of the ATCT, estimated at 267 feet, provides an adequate view of all runway ends and approaches. This location conflicts with the recommended CONRAC Alternative location.

ATCT Alternative 2 – This alternative shows the ATCT located south of the existing rental car turnaround facilities. This southernmost ATCT location requires the greatest height, 315 feet, to overcome the Airport's lower southern topography.

ATCT Alternative 3 – This alternative locates the ATCT near the terminal area building. The departure roadway and surrounding land rises in this area, providing line of sight benefits and lower ATCT height requirements. The required height at this located is estimated at 227 feet. This location is central to the runway configuration at COS and provides convenient access to roadways and utilities. It is placed adjacent to one of the recommended economy parking lots.

ATCT Alternative 4 – This alternative places the ATCT on the eastern border of the Airport. Because the land slowly rises in this area, the height of the ATCT at this location is estimated at 205 feet, the lowest of all alternatives. This location has the greatest potential to conflict with future opportunities for aeronautical and non-aeronautical expansion. Additionally, the ATCT is positioned in the existing Airport Surveillance Radar (ASR) critical area. While that may restrict the ATCT development, a recommendation considered later in the is chapter relocates the ASR, which may allow ATCT development in this area.

This Master Plan only provides a high-level siting analysis for the ATCT. The FAA must be engaged in any further siting, designing, and studying of the ATCT. The recommended location is presented with this future comprehensive evaluation in mind in order to maintain options and funding eligibility.

Based on the evaluation above, the recommended location of the ATCT is Alternative 3. This site is central to the airfield, provides clear views of all runway ends, has the second lowest height requirement, and does not conflict with other future potential uses.

Airport Surveillance Radar / East Deicing Apron

ASR Location

The ASR sits on COS's eastern boundary. The land it occupies could be developed for greater aeronautical or non-aeronautical uses or the ASR could conflict with future off-airport development. It is recommended that the Airport and FAA collaborate to move the ASR to a location within the airfield, away from other potential uses, and ideally suited for air operations. With more than a mile

between the runways, COS has land within the center of the airfield that could easily accommodate the ASR. The ASR should be positioned at least 1,500 feet from structures, buildings, or holding/parked aircraft. The FAA is currently working to upgrade ASR-9 radar sites to a modernized digital version known as the ASR-11. This upgrade may coincide well with the recommended relocation.

Figure 5-10 shows a possible location for the ASR within the airfield that meets these requirements. Although the final location will require additional study by the FAA, including this possible location on the Airport Layout Plan allows for future consideration and funding eligibility.

East Deicing Apron

The development of an East Deicing Apron will facilitate deicing access to aircraft using Runway 17L-35R and free much needed space on the Airport's terminal apron. This apron will serve as the primary deicing apron for air carrier aircraft and will house all air carrier deicing equipment and supplies.

The recommended apron configuration, as shown in **Figure 5-10**, is intended to allow aircraft to taxi into position, deice, and continue onto Taxiway H for departure. This new apron area does not conflict with any of the terminal alternatives previously evaluated. This concept was developed in collaboration with Airport management and operations staff. Final design will be determined when the project is initiated.

Figure 5-10: Airport Surveillance Radar / East Deicing Apron

Source: Jviation

Consolidated Airfield Maintenance / East Hangar Development

Consolidated Airfield Maintenance

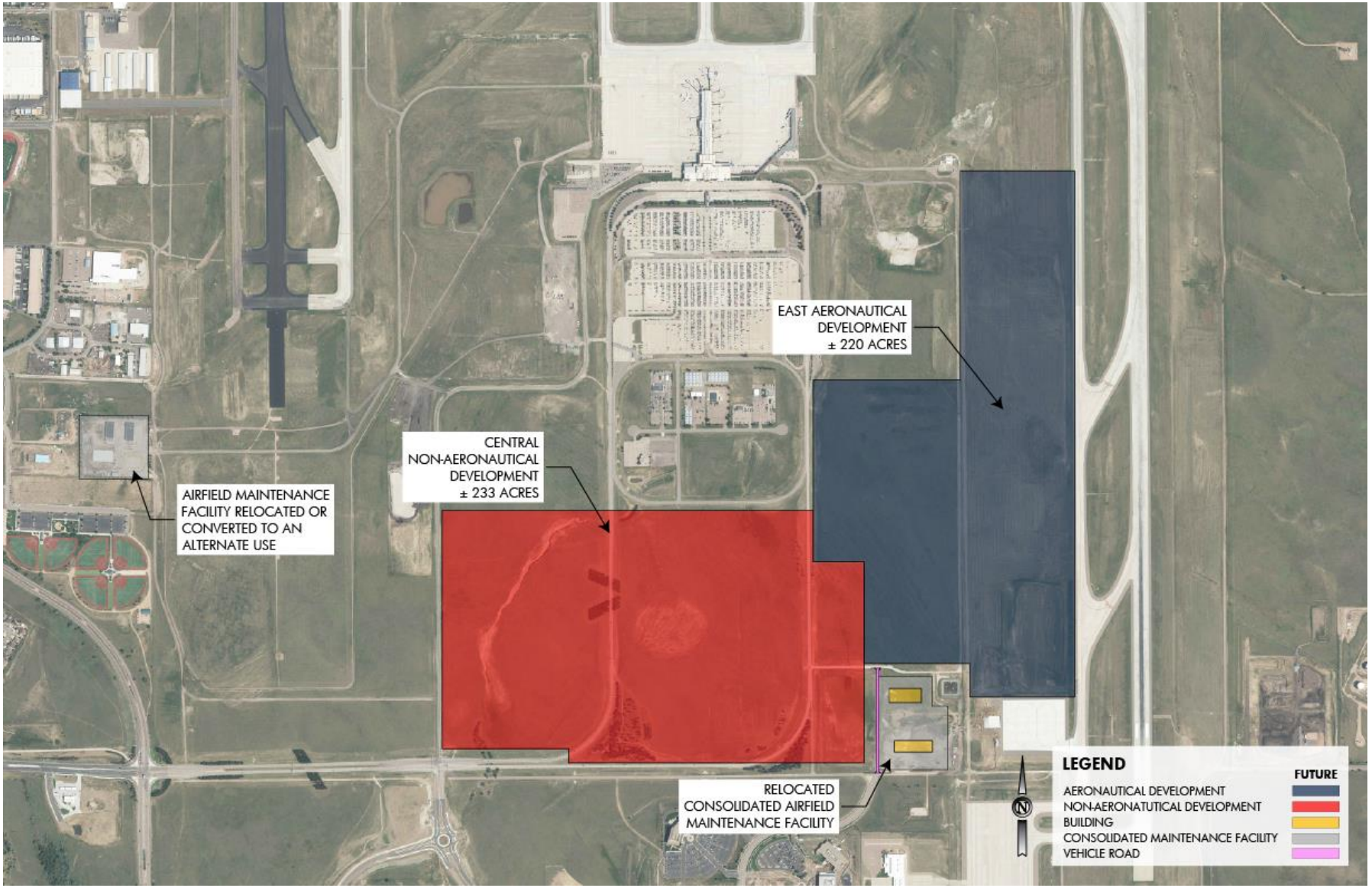
A preferred location for a consolidated airfield maintenance center was developed in consultation with Airport management and operations staff. This location on the east side of the airfield is shown in **Figure 5-11** and provides more convenient airfield access while freeing and maintaining land for aeronautical uses. This site provides more outdoor and indoor space for airfield and snow removal equipment storage and maintenance than the existing facility.

East Hangar Development

East hangar development is intended to accommodate large tenant aircraft, maintenance repair overhaul (MRO), and/or additional air cargo operators. The primary concern in this area is to preserve space for aeronautical use since it is conveniently located next to Runway 17L-35R. The hangars, apron, and taxiways illustrated in **Figure 5-11** are sized for large aircraft. Although the size and height of these hangars may change based on tenant needs, the large facilities shown illustrate the upper limits of hangar development in this area.

Based on discussions with Airport management, the alternatives shown represent preferred options for the consolidated airfield maintenance facility and east hangar development area, as these are deemed highly functional and appropriate uses for these areas. Although the final design of these facilities may change based on tenant specifications, these areas should be preserved for future aviation development to provide the greatest benefit to the Airport and its users.

Figure 5-11: Consolidated Airfield Maintenance / East Hangar Development



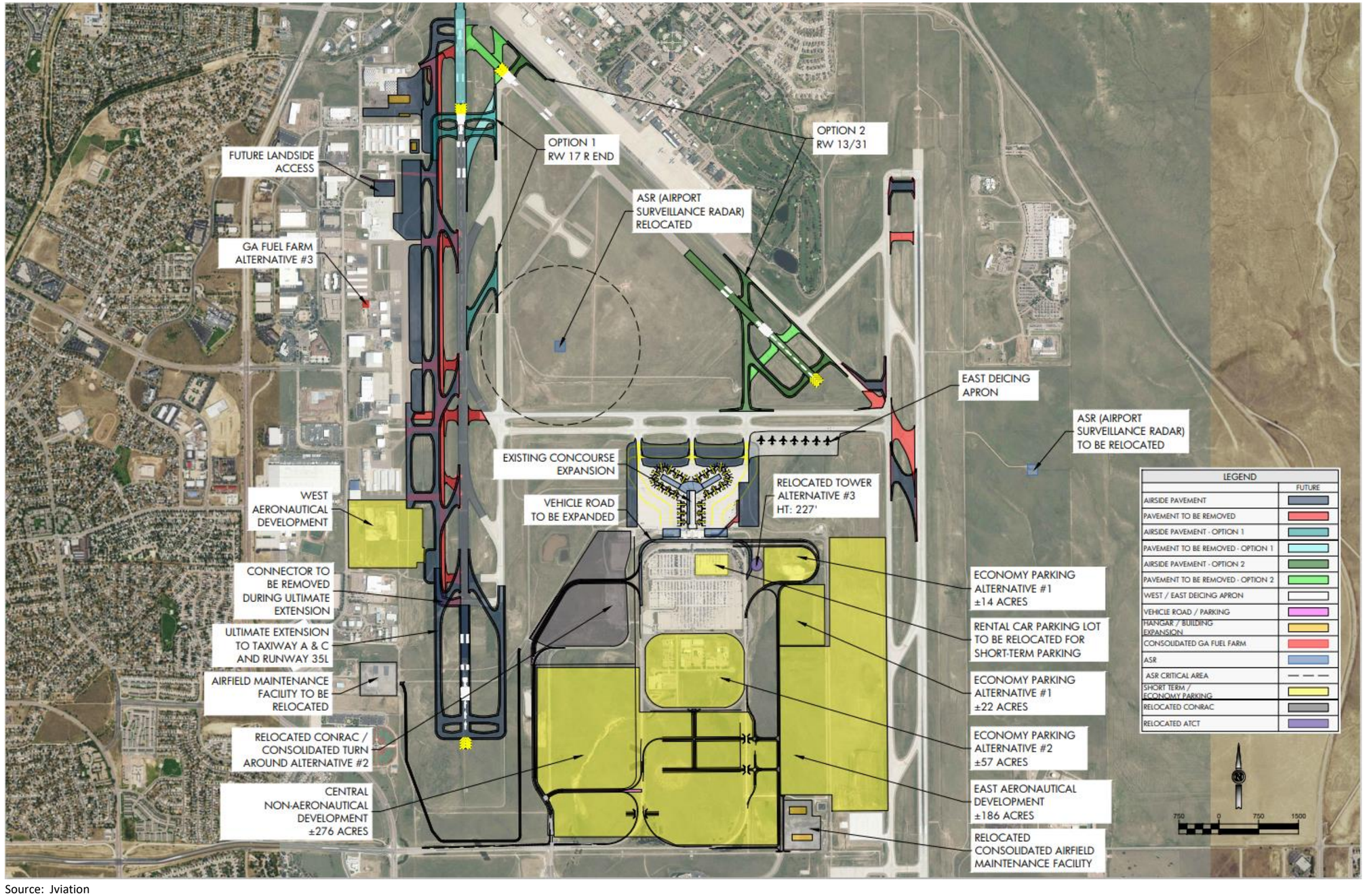
Source: Jviation

Development Plan Summary

Development plans may be modified over time as the needs of airport users change and new opportunities arise. As such, other alternatives may ultimately be developed and utilized, either individually or in conjunction, for different parts of the Airport depending on long-term needs. The recommended alternatives for the various elements discussed in this chapter, including the options for addressing HS 1, are combined in the overall Recommended Development Plan shown in **Figure 5-12**. This plan integrates existing roadway and land use plans for the Peak Innovation Park areas close to the terminal area as well as terminal curb front approach roadways designed to improve curb front access and capacity. The Plan does not include the recommendations for other area roadways for regional access to the Airport and the surrounding community (studied separately in the appendix).

This plan, along with recommended roadway improvements near the Airport, will be carried forward into the ALP set. Further study of the options shown to address HS 1 are recommended as a follow-on effort to the master plan. It is important to note that inclusion of the concept on the ALP does not commit nor obligate the City, Airport, State, or FAA to development or funding.

Figure 5-12: Recommended Development Plan


FUTURE LANDSIDE ACCESS
GA FUEL FARM ALTERNATIVE #3
OPTION 1 RW 17 R END
OPTION 2 RW 13/31
ASR (AIRPORT SURVEILLANCE RADAR) RELOCATED
EAST DEICING APRON
ASR (AIRPORT SURVEILLANCE RADAR) TO BE RELOCATED
EXISTING CONCOURSE EXPANSION
VEHICLE ROAD TO BE EXPANDED
RELOCATED TOWER ALTERNATIVE #3 HT: 227'
WEST AERONAUTICAL DEVELOPMENT
CONNECTOR TO BE REMOVED DURING ULTIMATE EXTENSION
ULTIMATE EXTENSION TO TAXIWAY A & C AND RUNWAY 35L
AIRFIELD MAINTENANCE FACILITY TO BE RELOCATED
RELOCATED CONRAC / CONSOLIDATED TURN AROUND ALTERNATIVE #2
CENTRAL NON-AERONAUTICAL DEVELOPMENT ±276 ACRES
ECONOMY PARKING ALTERNATIVE #1 ±14 ACRES
RENTAL CAR PARKING LOT TO BE RELOCATED FOR SHORT-TERM PARKING
ECONOMY PARKING ALTERNATIVE #1 ±22 ACRES
ECONOMY PARKING ALTERNATIVE #2 ±57 ACRES
EAST AERONAUTICAL DEVELOPMENT ±186 ACRES
RELOCATED CONSOLIDATED AIRFIELD MAINTENANCE FACILITY
LEGEND
FUTURE
AIRSIDE PAVEMENT
PAVEMENT TO BE REMOVED
AIRSIDE PAVEMENT - OPTION 1
PAVEMENT TO BE REMOVED - OPTION 1
AIRSIDE PAVEMENT - OPTION 2
PAVEMENT TO BE REMOVED - OPTION 2
WEST / EAST DEICING APRON
VEHICLE ROAD / PARKING
HANGAR / BUILDING EXPANSION
CONSOLIDATED GA FUEL FARM
ASR
ASR CRITICAL AREA
SHORT TERM / ECONOMY PARKING
RELOCATED CONRAC
RELOCATED ATCT
750 0 750 1500

Source: Jviation

6. Airport Layout Plan

Introduction

The Federal Aviation Administration (FAA) requires, in part, a current Airport Layout Plan (ALP) that has been approved by both the airport sponsor (City of Colorado Springs) and the FAA prior to the approval of an airport development project. The FAA further requires that the airport sponsor maintain an ALP that ensures the safety, utility, and efficiency of the airport. FAA sponsor grant assurance number 29 also requires that the city keep the ALP up to date at all times. As stated in FAA Order 5100.38, Airport Improvement Program Handbook, an ALP remains current for at least a five-year period unless major changes at the airport are made or planned.

As noted in FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, the five primary functions of the ALP are:

- Create a blueprint for airport development by depicting proposed facility improvements. The ALP provides a guideline by which the airport sponsor can ensure that development maintains airport design standards and safety requirements and is consistent with airport and community land use plans.
- A public document that serves as a record of aeronautical requirements, both present and future, and as a reference for community deliberations on land use proposals and budget resource planning.
- To enable the airport sponsor and the FAA to plan for facility improvements at the airport. It also allows the FAA to anticipate budgetary and procedural needs. The approved ALP also allows the FAA to protect the airspace required for facility or approach procedure improvements.
- To serve as a working tool for the airport sponsor, particularly its development and maintenance staff.
- Requirement for the airport sponsor to receive FAA financial assistance.

The Colorado Springs Airport (COS or the Airport) ALP drawing set was developed in conformance with FAA SOP 2.00, ALP Review Checklist, dated October 1, 2013. The specific drawings included in the ALP set are determined by a number of factors, including the number of runways at the airport, and the type of instrument approaches.

Airport Layout Plan Drawing Set Elements

The following is a brief description of the ALP drawing sheets. FAA SOP 2.00 provides a detailed checklist of items required to be included in each drawing.

Title Sheet: includes sponsor approval signature block, airport location maps, and other pertinent information as required by the local FAA Airports office.

Airport Data Sheet: A separate sheet containing basic airport and runway/taxiway data tables. This sheet also contains wind roses, modifications to standards, declared distances, and information about non-standard conditions.

Airport Layout Plan: illustrates the existing and future airport facilities (two drawings). The drawings include the depiction of all applicable design standards contained in the latest version of AC 150/5300-13, including but not limited to, landing areas, movement areas and aircraft parking areas (e.g., runways, taxiways, helipads, aprons, etc.), required facility identifications, description labels, imaginary surfaces, Runway Protection Zones, Runway and Taxiway Safety Areas, Runway and Taxiway Object Free Areas, and Runway Obstacle Free Zones. FAA approval signature block (future drawing).

Terminal Area Plan(s): presents a large-scale depiction of areas with significant terminal facility development. The Terminal Area drawing is an enlargement of a portion of the ALP. This set contains three drawings that focus on distinct areas of the Airport.

Airport Airspace Drawing: 14 CFR Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace, defines the five imaginary surfaces that are depicted for each runway and the airport as a whole. This drawing depicts the obstacle identification surfaces for the full extent of all airport development. It also depicts airspace obstructions for the portions of the surfaces excluded from the Approach/Departure Plan and Profile Drawings. Following this drawing is an Obstruction Table Sheet that provides detail about the obstructions shown on the Airport Airspace Drawing.

Approach/Departure Plan and Profile Drawings: is the plan and profile view of the inner portion of the approach surface and departure surface to each runway end, as well as a tabular listing of all of the associated surface penetrations. The drawing depicts the obstacle identification approach surfaces contained in 14 CFR Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace. The drawing also depicts other approach surfaces including the threshold-siting surface and those surfaces associated with United States Standards for Instrument Procedures (TERPS). The departure surfaces are shown for runway end(s) designated primarily for instrument departures.

Land Use Drawing: shows the land uses within the airport property boundary. It also depicts land uses and zoning districts in the area around the airport, outside

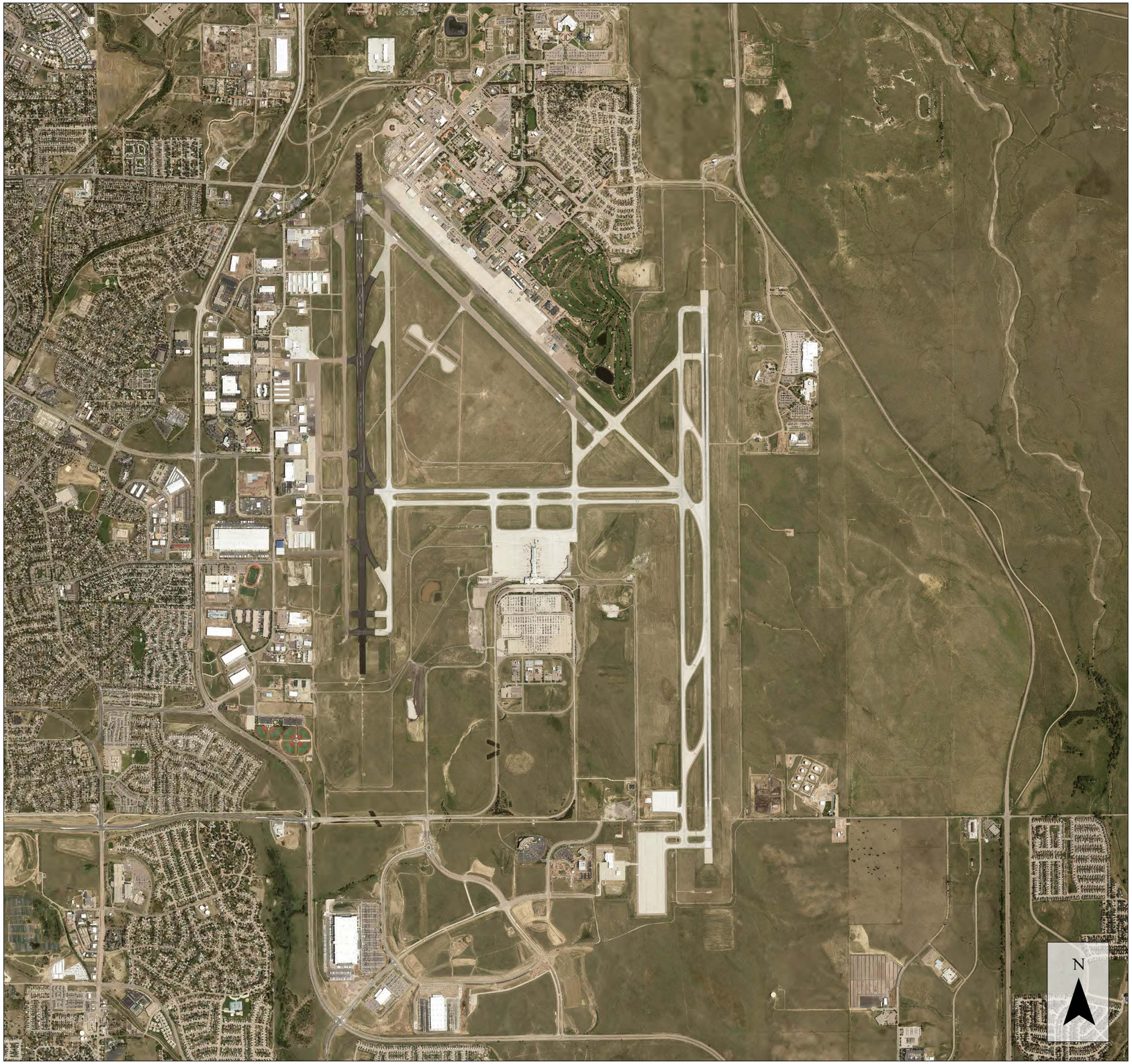
of the airport property boundary. Noise contours illustrate the expected DNL contours produced from the Airport's Annual Service Volume (ASV).

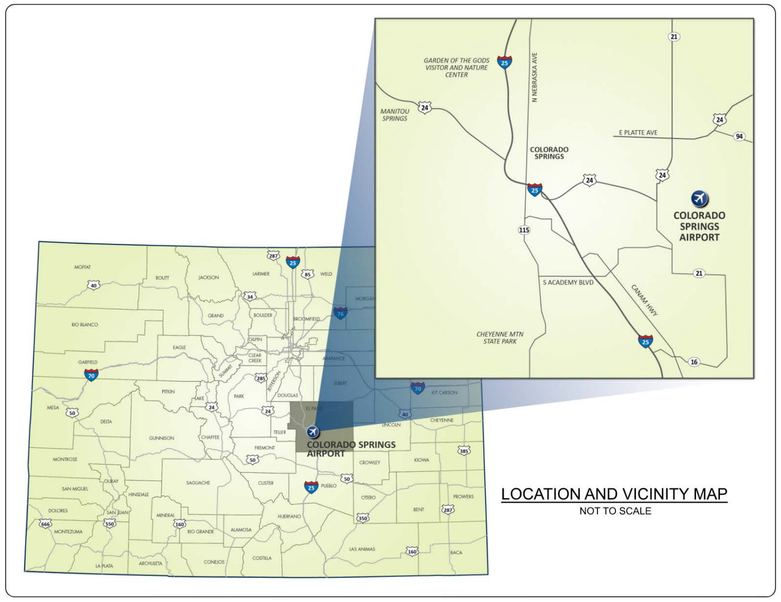
Airport Property Map (Exhibit A): depicts the airport property boundary, the various tracts of land that were acquired to develop the airport, and the methods of acquisition (where appropriate). The drawing also depicts land developed as Peak Innovation Park and easements beyond the airport boundary.

CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT

EL PASO COUNTY, COLORADO

AIRPORT LAYOUT PLAN
JANUARY 2023





LOCATION AND VICINITY MAP
NOT TO SCALE

SHEET INDEX		
NUMBER	DESCRIPTION	REVISION DATE
1	TITLE SHEET	
2	AIRPORT DATA SHEET	
3	AIRPORT LAYOUT PLAN - EXISTING	
4	AIRPORT LAYOUT PLAN - FUTURE	
5	TERMINAL AREA DRAWING	
6	GENERAL AVIATION APRON AREA DRAWING	
7	EAST DEVELOPMENT AND MILITARY APRON AREA DRAWING	
8	AIRPORT AIRSPACE DRAWING	
9	AIRPORT AIRSPACE PROFILES DRAWING	
10	OBSTRUCTION TABLE SHEET	
11	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY - 17L	
12	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY - 35R	
13	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY - 17R	
14	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY - 35L	
15	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY - 13	
16	APPROACH/DEPARTURE PLAN AND PROFILE RUNWAY - 31	
17	LAND USE DRAWING	
18	EXHIBIT 'A' AIPORT PROPERTY INVENTORY MAP	

SPONSOR APPROVAL	
Gregory S. Phillips, AAE (Jun 21, 2023 22:54 MDT)	
NAME	Director of Aviation
TITLE	Jun 21, 2023
DATED	

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT
(COS)
COLORADO SPRINGS, CO

DES: K.D.
DR: K.D.
CH: T.D.
APP: T.D.

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

TITLE SHEET

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: JANUARY 2023

SHEET NO. 1 of 18

RUNWAY DATA TABLE

ITEM		EXISTING						FUTURE									
								OPTION 1						OPTION 2			
RUNWAY IDENTIFICATION		17L	35R	17R	35L	13	31	17L	35R	17R	35L	13	31	17R	35L	13	31
RUNWAY DESIGN CODE (RDC)		D-IV-1200		D-IV-1200		D-IV-5000		SAME		SAME		SAME		SAME		SAME	
PAVEMENT STRENGTH & MATERIAL TYPE	SURFACE MATERIAL	CONCRETE		ASPHALT		ASPHALT		SAME		SAME		SAME		SAME		SAME	
	STRENGTH BY WHEEL LOADING (LBS, THOUSANDS)	120.0(SW), 250.0(DW), 550.0(DT), 1,120.0 (DDT)		120.0(SW), 250.0(DW), 550.0(DT), 1,120.0 (DDT)		120.0(SW), 171.0(DW), 279.0(DT), 691.0 (DDT)		SAME		SAME		SAME		SAME		SAME	
	CLASSIFICATION (UTILITY/OTHER THAN UTILITY)	OTHER THAN UTILITY		OTHER THAN UTILITY		OTHER THAN UTILITY		SAME		SAME		SAME		SAME		SAME	
	PCN (FOR BEARING STRENGTH OF 12,500 LBS OR GREATER)	95/R/B/W/T (LOAD CARRYING CAPACITY, RIGIDITY, STRENGTH, MAX TIRE PRESSURE, METHOD)		99/F/B/X/T		48/F/C/X/T		SAME		SAME		SAME		SAME		SAME	
	SURFACE TREATMENT	GRVD		GRVD		GRVD		SAME		SAME		SAME		SAME		SAME	
RUNWAY GRADIENT	EFFECTIVE GRADIENT (%)	0.620%		1.190%		0.430%		SAME		1.051%		0.179%		1.060%		0.002%	
	MAXIMUM GRADIENT (%)	0.750%		1.280%		0.870%		SAME		1.930%		1.360%		1.930%		1.360%	
	LINE OF SIGHT CRITERIA MET (YES/NO)	YES		YES		YES		SAME		SAME		SAME		SAME		SAME	
PERCENT WIND COVERAGE (COMBINED ALL WEATHER)	A-I AND B-I (10.5 KTS)	96.4%						SAME		SAME		SAME		SAME		SAME	
	A-II AND B-II (13 KTS)	98.1%						SAME		SAME		SAME		SAME		SAME	
	A-III,B-III, C-I THROUGH D-III, D-I THROUGH D-III (16 KTS)	99.2%						SAME		SAME		SAME		SAME		SAME	
	A-IV,B-IV, C-IV THROUGH C-VI, D-IV THROUGH D-VI (20 KTS)	99.8%						SAME		SAME		SAME		SAME		SAME	
RUNWAY DIMENSIONS (LENGTH X WIDTH) (FT)		13,501 X 150		11,022 X 150		8,269 X 150		SAME		11,730 x 150		SAME		13,519 x 150		8,099 x 150	
DISPLACED THRESHOLD (FT)		N/A	N/A	N/A	N/A	N/A	356	SAME	SAME	SAME	775	SAME	SAME	SAME	775	SAME	1,173
RUNWAY SAFETY AREA (RSA)	LENGTH BEYOND RUNWAY END STANDARD/ACTUAL (FT)	1,000/1,000	1,000/1,000	1,000/1,000	1,000/1,000	1,000/1,000	1,000/1,000	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
	WIDTH STANDARD/ACTUAL (FT)	500		500		500		SAME		SAME		SAME		SAME		SAME	
RUNWAY END COORDINATES	RUNWAY END LATITUDE	38° 48' 57.91" N	38°46'44.51" N	38° 49'26.67" N	38° 47'37.77" N	38° 49'23.36" N	38° 48'25.49" N	SAME	SAME	38° 49' 08.98" N	38° 47' 13.06" N	SAME	SAME	SAME	38° 47' 13.06" N	38° 49' 16.45" N	38° 48' 19.77" N
	RUNWAY END LONGITUDE	104°41'08.64" W	104°41'08.87" W	104°42'57.22" W	104°42'57.36" W	104°42'55.28" W	104°41'41.53" W	SAME	SAME	104°42'57.24" W	104°42'57.39" W	SAME	SAME	SAME	104°42'57.39" W	104°42'46.47" W	104°41'34.24" W
	DISPLACED THRESHOLD LATITUDE	N/A	N/A	N/A	N/A	N/A	38° 48' 27.98" N	SAME	SAME	N/A	38° 47' 20.72" N	N/A	SAME	SAME	38° 47' 20.72" N	SAME	SAME
	DISPLACED THRESHOLD LONGITUDE	N/A	N/A	N/A	N/A	N/A	104°41'44.70" W	SAME	SAME	N/A	104°42'57.38" W	N/A	SAME	SAME	104°42'57.38" W	SAME	SAME
RUNWAY ELEVATIONS	RUNWAY END (FT)	6,187.0	6,102.7	6,176.4	6,045.0	6,173.1	6,137.1	SAME	SAME	6,157.1	6,033.1	SAME	SAME	SAME	6,033.1	6,171.3	6,156.8
	DISPLACED THRESHOLD (FT)	N/A	N/A	N/A	N/A	N/A	6,134.6	SAME	SAME	N/A	6,037.0	N/A	SAME	SAME	6,037.0	SAME	6,151.8
	TOUCHDOWN ZONE (TDZ) (FT)	6,187.0	6,117.7	6,176.4	6,074.6	6,173.1	6,154.7	SAME	SAME	6,157.1	6,048.9	SAME	SAME	SAME	6,048.9	6,171.3	6,156.8
	HIGH POINT(FT)	6,187.8		6,176.4		6,173.1		SAME		6,157.1		SAME		6,176.4		6,171.3	
	LOW POINT(FT)	6,102.8		6,045.1		6,134.5		SAME		6,033.1		SAME		6,033.1		6,147.1	
RUNWAY LIGHTING TYPE		HIRL		HIRL		MIRL		SAME		SAME		SAME		SAME		SAME	
RUNWAY PROTECTION ZONE (RPZ)	LENGTH (FT)	2,500	1,700	1,700	2,500	1,700	1,700	SAME	2,500	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
	INNER WIDTH (FT)	1,000	1,000	1,000	1,000	500	500	SAME	1,000	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
	OUTER WIDTH (FT)	1,750	1,510	1,510	1,750	1,010	1,010	SAME	1,750	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
RUNWAY MARKING TYPE		PRECISION	PRECISION	PRECISION	PRECISION	NON - PRECISION	NON - PRECISION	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
14 CFR PART 77 APPROACH CATEGORY	APPROACH TYPE	PRECISION	PRECISION	NON - PRECISION	PRECISION	VISUAL	NON - PRECISION	SAME	SAME	PRECISION	SAME	SAME	SAME	PRECISION	SAME	SAME	SAME
	APPROACH SURFACE DIMENSIONS (FT)	1,000 X 16,000 X 50,000	1,000 X 16,000 X 50,000	1,000 X 4,000 X 10,000	1,000 X 16,000 x 50,000	500 X 1,500 X 5,000	500 X 3,500 X 10,000	SAME	SAME	1,000 X 16,000 X 50,000	SAME	SAME	SAME	1,000 X 16,000 X 50,000	SAME	SAME	SAME
	APPROACH SURFACE SLOPE	50:1/40:1	50:1/40:1	34:1	50:1/40:1	20:1	34:1	SAME	SAME	50:1/40:1	SAME	SAME	SAME	50:1/40:1	SAME	SAME	SAME
VISIBILITY MINIMUMS	RUNWAY VISUAL RANGE (RVR) (FT)	1,400	4,000	4,000	1,200	N/A	5,000	SAME	1,600	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
	INSTRUMENT FLIGHT VISIBILITY CATEGORY (SM)	<1/4	3/4	3/4	<1/4	VISUAL	1	SAME	1/4	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
TYPE OF AERONAUTICAL SURVEY FOR APPROACH		VERT. GUIDED	VERT. GUIDED	VERT. GUIDED	VERT. GUIDED	N/A	NOT VERT. GUIDED	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
RUNWAY DEPARTURE SURFACE (YES OR N/A)		YES	YES	YES	YES	YES	YES	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
RUNWAY OBJECT FREE AREA (ROFA)	LENGTH BEYOND RUNWAY END STANDARD/ACTUAL (FT)	1,000/1,000	1,000/1,000	1,000/1,000	1,000/1,000	1,000/1,000	1,000/1,000	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
	WIDTH STANDARD/ACTUAL (FT)	800		800		800		SAME		SAME		SAME		SAME		SAME	
RUNWAY OBSTACLE FREE ZONE (ROFZ)	LENGTH BEYOND RUNWAY END STANDARD/ACTUAL (FT)	200/200	200/200	200/200	200/200	200/200	200/200	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
	WIDTH STANDARD/ACTUAL (FT)	400		400		400		SAME		SAME		SAME		SAME		SAME	
THRESHOLD SITING SURFACE	SURFACE DIMENSIONS (FT)	0 X 350 X 1,520 X 10,200 (TYPE 6) 200 X 400 X 3,400 X 10,000 (TYPE 5)	0 X 350 X 1,520 X 10,200 (TYPE 6) 200 X 400 X 3,400 X 10,000 (TYPE 5)	0 X 350 X 1,520 X 10,200 (TYPE 6) 200 X 400 X 3,400 X 10,000 (TYPE 5)	0 X 350 X 1,520 X 10,200 (TYPE 6) 200 X 800 X 3,400 X 10,000 (TYPE 5)	400 X 1,000 X 1,500 X 8,500 (TYPE 3)	200 X 400 X 3,400 X 10,000 (TYPE 4)	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
	SLOPE	30:1/34:1	30:1/20:1	30:1/20:1	30:1/34:1	20:1	20:1	SAME	30:1/34:1	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
	PENETRATIONS	NONE	NONE	NONE	NONE	NONE	NONE	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
VISUAL AND INSTRUMENT NAVAIDS (FOR EACH RUNWAY END)		ILS (CAT II), DME, GPS, RNAV, MALSR, PAPI	ILS, DME, GPS, RNAV, REIL, PAPI	RNAV, REIL, PAPI	ILS (CAT II),RNAV, MALSR, PAPI	PAPI, REIL	RNAV, REIL, PAPI	SAME	ILS (CAT II), LOC, RNAV(RNP), RNAV (GPS), PAPI, MALSR/ALSF-2	ILS, RNAV, REIL, PAPI	SAME	SAME	SAME	ILS, RNAV, REIL, PAPI	SAME	SAME	SAME

AIRPORT DATA TABLE

ITEM		EXISTING	FUTURE - OPTION 1	FUTURE - OPTION 2
AIRPORT REFERENCE CODE (ARC)		D-IV	SAME	SAME
MEAN MAX TEMPERATURE OF THE HOTTEST MONTH		84°	SAME	SAME
AIRPORT ELEVATION (MSL)(FT)		6,187.0	SAME	SAME
AIRPORT NAVIGATIONAL AIDS		DME, ILS, RNAV, NDB, ASR, BEACON	SAME	SAME
AIRPORT REFERENCE POINT (ARP)	LATTITUDE	38° 48' 20.94" N	38° 48' 15.57" N	38° 48' 15.36" N
	LONGITUDE	104° 42' 02.79" W	104° 42' 08.49" W	104° 42' 04.47" W
MISCELLANEOUS FACILITIES		WINDCONE	SAME	SAME
ARC AND CRITICAL AIRCRAFT	ARC	D-IV	SAME	SAME
	CRITICAL AIRCRAFT	B767-400	SAME	SAME
	WINGSPAN (FT)	170.3	SAME	SAME
	TAIL HEIGHT (FT)	55.8	SAME	SAME
	UNDERCARRIAGE WIDTH (FT)	36	SAME	SAME
	APPROACH SPEED (KTS)	150	SAME	SAME
	MAXIMUM TAKEOFF WEIGHT (LBS)	450,000	SAME	SAME
AIRPORT MAGNETIC VARIATION	VARIATION	7° 39' E ± 0° 22' CHANGING BY 0° 6'W PER YEAR	SAME	SAME
	DATE	2021-09-02	SAME	SAME
	SOURCE	NOAA	SAME	SAME
NPIAS SERVICE LEVEL		COMMERCIAL SERVICE - PRIMARY	SAME	SAME
STATE EQUIVALENT SERVICE ROLE		COMMERCIAL SERVICE	SAME	SAME

MODIFICATION TO STANDARDS

DESCRIPTION/LOCATION	FAA STANDARD	EXISTING CONDITION	FUTURE/PROPOSED CONDITION	AIRSPACE CASE NO.	DATE
TW F LONGITUDINAL GRADIENT BETWEEN TW M AND TW B (BETWEEN STA. 358+25 AND STA. 352+61.95) AND (BETWEEN STA. 351.18.76 TO STA. 352.61.95)	±1.5%	1.7% TO 2.0% BETWEEN STA. 358+25 AND STA. 352+61.95 AND 1.73% BETWEEN STA.351+18.76 TO STA. 352+61.95	SECTION OF TW F BETWEEN TW M AND TW B TO BE REMOVED WITH 817' EXTENSION OF RW 31		SUBMITTED 5/22/2012
RW 13 END RSA LOGITUDINAL GRADIENT FOR FIRST 200' BEYOND THRESHOLD	0% TO -3%	0.0075	RW 13 END RSA TO BE SHIFTING INWARD WITH 987' THRESHOLD RELOCATION	93-ANM/D-063-NRA	SUBMITTED 11/3/2011
RW 31 LONGITUDINAL GRADIENT AND VERTICAL CURVE LENGTH IN FIRST QUARTER OF RW	± 0.8% LONGITUDINAL GRADE AND MINIMUM VERTICAL CURVE LENGTH OF 1,000' FOR EACH 1% OF GRADE CHANGE	1.87% LONGITUDINAL GRADE AND 500' VERTICAL CURVE AT STA. 82+50	RW 31 LONGITUDINAL GRADIENT TO BE ADDRESS WHEN RW 31 IS EXTENDED 817'	93-ANM/D-012-NRA	SUBMITTED 11/3/2011
TW MIL LONGITUDINAL GRADE AT RW 13/31	± 1.5%	-0.0225	REMOVE TW B4 FROM APPOVED MOS ON RECORD AS IT NOW MEETS STANDARD LONGITUDINAL GRADE REQUIREMENTS	93-ANM/D-063-NRA	SUBMITTED 11/3/2011
TW MIL LENGTH OF LEAD-IN TO FILLETS AT RW 13/31	250' LEAD-IN LENGTH TO FILLETS	0' LEAD-IN LENGTH TO FILLETS	DEDICATED MILITARY USE	93-ANM/D-063-NRA	SUBMITTED 11/3/2011
TW G LONGITUDINAL GRADIENT FROM CENTERLINE TO NORTH EDGE AT TW B (BETWEEN STA. 176+00 AND STA. 173+75)	± 1.5%	-0.019	TW B TO BE REMOVED WHERE IT MEETS TW G TO ADDRESS HS 3		APPROVED 9/6/2007

NON-STANDARD CONDITIONS

DESCRIPTION/LOCATION	FAA STANDARD	EXISTING CONDITION	FUTURE/PROPOSED CONDITION
TW A LENGTH OF LEAD-IN TO FILLET AT SOUTHWEST CORNER OF TL SOUTH OF TW A4	250' LEAD-IN LENGTH TO FILLETS	0' LEAD-IN LENGTH TO FILLETS	TO BE ADRESSED IN "REALIGNMENT OF TW "A" TO 500' FROM RW 17R-35L" PROJECT
TW A2,A3, AND A4 WEST OF TW A FILLET WIDTH	85' FILLET RADIUS (COCKPIT OVER CENTERLINE)	105' FILLET RADIUS (JUDGMENTAL OVERSTEERING)	TO BE ADRESSED IN "REALIGNMENT OF TW "A" TO 500' FROM RW 17R-35L" PROJECT
RW 17R/35L LONGITUDINAL GRADIENT FOR THE LAST QUARTER OF RW LENGTH AT BOTH ENDS	±0.8% LONGITUDINAL GRADE	0.9% TO 1.21% IN NORTH QUARTER 0.7% TO 1.36% IN SOUTH QUARTER	RECONSTRUCT RW 17R/35L AND ELIMINATE A NON-STANDARD GRADIENT WHEN THE RW IS EXTENDED
TW A2 LONGITUDINAL GRADE AT RW 17R/35L	±1.5%	1.80%	TO BE ADRESSED IN "REALIGNMENT OF TW "A" TO 500' FROM RW 17R-35L" PROJECT
TW A3 LONGITUDINAL GRADE AT RW 17R/35L	±1.5%	1.81%	TO BE ADRESSED IN "REALIGNMENT OF TW "A" TO 500' FROM RW 17R-35L" PROJECT
TW A4 LONGITUDINAL GRADE AT RW 17R/35L	±1.5%	2.21%	TO BE ADRESSED IN "REALIGNMENT OF TW "A" TO 500' FROM RW 17R-35L" PROJECT
TW A4 LONGITUDINAL GRADE BREAK	MINIMUM VERTICAL CURVE LENGTH OF 100' FOR EACH 1% OF GRADE CHANGE	GRADE BREAK AT THE RW EDGE OF 0.71% WITHOUT A VERTICAL CURVE	TO BE ADRESSED IN "REALIGNMENT OF TW "A" TO 500' FROM RW 17R-35L" PROJECT
TW H TRANSVERSE GRADIENT BETWEEN TW M AND TW E (BETWEEN STA. 159+00 AND STA. 176+00)	CROWNED PAVEMENT SECTION WITH 1% TO 1.5% CROSS SLOPE	TRANSVERSE PAVEMENT SECTION WITH 1.5% CROSS SLOPE	CONDITIONS TO BE RE-ASSESSED AT THE TIME OF NEXT REHABILITATION
TW E1,E7, AND E8 TRANSVERSE GRADIENT	CROWNED PAVEMENT SECTION WITH 1% TO 1.5% CROSS SLOPE	TRANSVERSE PAVEMENT SECTION WITH CROSS SLOPE	CONDITIONS TO BE RE-ASSESSED AT THE TIME OF NEXT REHABILITATION
RW 17L/35R AND TW E CONNECTORS LIGHTING	COUNTERPOISE SHALL NOT BE CONNECTED TO LIGHT FIXTURE BASE CAN OR MOUNTING STAKE, EXCEPT FOR ON FIXTURE BASES OF RW TDZ LIGHTS, RW CL LIGHTS INSTALLED IN RIGID PAVEMENT. A SAFTEY GROUND MUST BE INSTALLED AT EACH LIGHT FIXTURE	COUNTERPOISE CONNECTED TO EACH LIGHT FIXTURE BASE CAN FOR ALL LIGHTS. NO SAFETY GROUND WIRE INSTALLED	CONDITIONS TO BE RE-ASSESSED AT THE TIME OF NEXT REHABILITATION

TAXIWAY AND TAXILANE DATA TABLE

ITEM	EXISTING	FUTURE
TAXIWAY DESIGN GROUP (TDG)	5	SAME
AIRPLANE DESIGN GROUP (ADG)	IV	SAME
TAXIWAY WIDTH STANDARD/ACTUAL (FT)	75/75	SAME
TAXIWAY SAFETY AREA (TSA) WIDTH (FT)	171	SAME
TAXIWAY OBJECT FREE AREA (TOFA) WIDTH (FT)	259	SAME
TAXIWAY CENTERLINE TO FIXED OR MOVEABLE OBJECT (FT)	129.5	SAME
TAXIWAY LIGHTING	MITL	SAME

NOTES

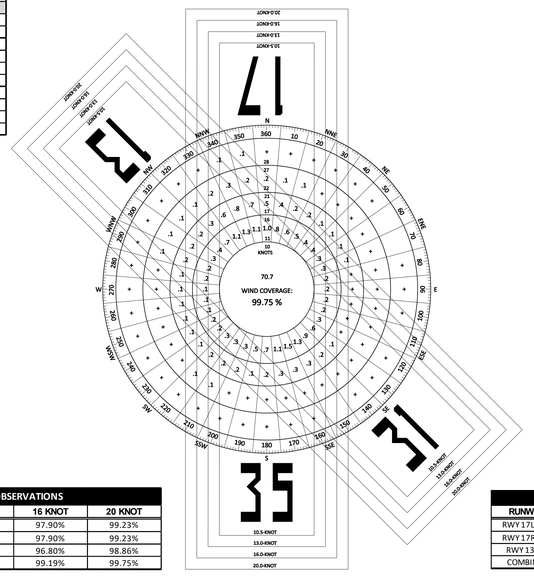
1. ALL HORIZONTAL COORDINATES - NAD83/2011.
2. ALL VERTICAL ELEVATIONS - NAVD88 AND MEAN SEA LEVEL (MSL).
3. ULTIMATE RUNWAY END ELEVATIONS ARE ESTIMATED.
4. NO PENETRATIONS IN THRESHOLD SITING SURFACES (E).
5. ANY OBJECTS WITHIN THE ULTIMATE TSA OR TOFA ARE TO BE REMOVED.
6. RUNWAY OPTIONS 1 AND 2 ARE ALTERNATIVES TO RESOLVE HOT SPOT #1 AND REQUIRE FURTHER STUDY.

SOURCES

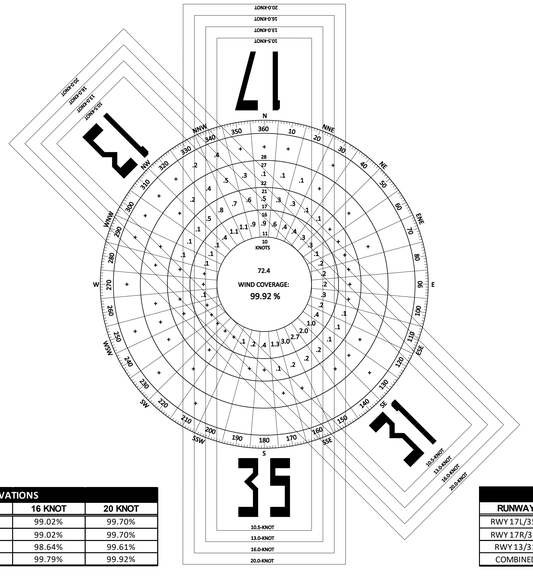
1. WIND DATA – NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, STATION 722060, PERIOD RECORD 2009-2018.
2. MAGNETIC VARIATION - NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) - 08/2020.

DECLARED DISTANCES

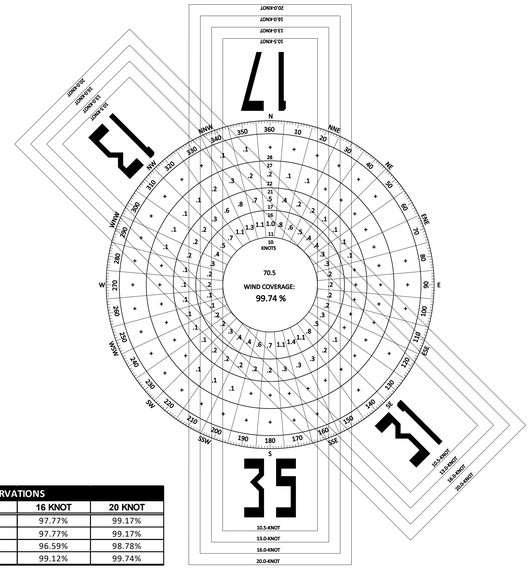
	RUNWAY ID	TAKE OFF RUN AVAILABLE (TORA) (FT)	TAKE OFF DISTANCE AVAILABLE (TODA) (FT)	ACCELERATED STOP DISTANCE AVAILABLE (ASDA) (FT)	LANDING DISTANCE AVAILABLE (LDA) (FT)	STOPWAY LENGTH (FT)	CLEARWAY LENGTH (FT)
EXISTING	17L	13,501	13,501	13,501	13,501	N/A	N/A
	35R	13,501	13,501	13,501	13,501	N/A	N/A
	17R	11,022	11,022	11,022	11,022	N/A	N/A
	35L	11,022	11,022	11,022	11,022	N/A	N/A
	13	8,269	8,269	8,269	8,269	N/A	N/A
	31	8,269	8,269	8,269	7,913	N/A	N/A
FUTURE	17L	13,501	13,501	13,501	13,501	N/A	N/A
	35R	13,501	13,501	13,501	13,501	N/A	N/A
	17R OPT 1	11,793	11,793	11,793	11,793	N/A	N/A
	35L OPT 1	11,793	11,793	11,793	11,018	N/A	N/A
	13 OPT 1	8,269	8,269	8,269	8,269	N/A	N/A
	31 OPT 1	8,269	8,269	8,269	7,913	N/A	N/A
	17R OPT 2	13,522	13,522	13,522	13,522	N/A	N/A
	35L OPT 2	13,522	13,522	13,522	12,747	N/A	N/A
	13 OPT 2	7,279	7,279	7,696	7,696	N/A	N/A
	31 OPT 2	7,696	7,696	7,696	6,525	N/A	N/A



ALL WEATHER -98,810 OBSERVATIONS				
RUNWAY	10.5 KNOT	13 KNOT	16 KNOT	20 KNOT
RWY 17L/35R	91.98%	95.42%	97.90%	99.23%
RWY 17R/35L	91.98%	95.42%	97.90%	99.23%
RWY 13/31	88.92%	93.27%	96.80%	98.86%
COMBINED	96.42%	98.12%	99.19%	99.75%



IFR - 10,817 OBSERVATIONS				
RUNWAY	10.5 KNOT	13 KNOT	16 KNOT	20 KNOT
RWY 17L/35R	93.93%	97.10%	99.02%	99.70%
RWY 17R/35L	93.93%	97.10%	99.02%	99.70%
RWY 13/31	93.55%	96.46%	98.64%	99.61%
COMBINED	98.36%	99.37%	99.79%	99.92%



VFR - 88,353 OBSERVATIONS				
RUNWAY	10.5KNOT	13 KNOT	16 KNOT	20 KNOT
RWY 17L/35R	91.77%	95.23%	97.77%	99.17%
RWY 17R/35L	91.77%	95.23%	97.77%	99.17%
RWY 13/31	88.39%	92.91%	96.59%	98.78%
COMBINED	96.19%	97.98%	99.12%	99.74%

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: K.D.
CH: T.D.
APP: T.D.

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

AIRPORT DATA SHEET

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: DECEMBER 2022

DATE 10/2021
7° 39' E ± 0° 22'
ANNUAL RATE OF CHANGE: 0° 6' W
SOURCE: U.S. NOAA
0 400 800 1,200 Feet

RWY 17L APPROACH SURFACE (E) SLOPE 40:1
RWY 17L THRESHOLD SITING SURFACE (E) TYPE 5 SLOPE 34:1
RWY 17L APPROACH SURFACE (E) SLOPE 50:1
RWY 17L THRESHOLD SITING SURFACE (E) TYPE 6 SLOPE 30:1
RWY 17L THRESHOLD SITING SURFACE (E) TYPE 5 SLOPE 34:1
RWY 17R APPROACH SURFACE (E) SLOPE 34:1
RWY 17R THRESHOLD SITING SURFACE (E) TYPE 6 SLOPE 30:1
RWY 17R RPZ (E) INNER WIDTH: 1,000' OUTER WIDTH: 1,510' LENGTH: 1,700'
RWY 17R THRESHOLD SITING SURFACE (E) TYPE 5 SLOPE 20:1
RWY 13 THRESHOLD SITING SURFACE (E) TYPE 3 SLOPE 20:1
RWY 13 RPZ (E) INNER WIDTH: 500' OUTER WIDTH: 1,010' LENGTH: 1,700'
RWY 13 APPROACH SURFACE (E) SLOPE 20:1

RWY END 17L (E)
RWY 17L TDZE (E)
RWY HIGH POINT 17L/35R (E)
EL: 6,187.0'
LAT: 38° 48' 57.91" N
LON: 104° 41' 08.64" W

COS E (SACS)
EL: 6,223.6'
LAT: 38° 48' 45.75" N
LON: 104° 40' 58.59" W

COS D 1996 (PACS)
EL: 6,175.8'
LAT: 38° 48' 11.70" N
LON: 104° 40' 58.59" W

RUNWAY 17L/35R (13,500'X150') (E) TRUE BEARING: 180°04'38.62"

RWY 31 THRESHOLD SITING SURFACE (E) TYPE 4 SLOPE 20:1
RWY 31 APPROACH SURFACE (E) SLOPE 34:1
RWY END 35R (E)
RWY LOW POINT 17L/35R (E)
EL: 6,102.7'
LAT: 38° 46' 44.51" N
LON: 104° 41' 08.87" W
RWY 35R THRESHOLD SITING SURFACE (E) TYPE 5 SLOPE 20:1
CELL TOWER
RWY 35R TDZE (E)
EL: 6,117.7'
LAT: 38° 47' 14.12" N
LON: 104° 41' 08.82" W
RWY 35R RPZ (E) INNER WIDTH: 1,000' OUTER WIDTH: 1,510' LENGTH: 1,700'
RWY 35R APPROACH SURFACE (E) SLOPE 50:1

RWY END 31 (E)
RWY 13/31 LOW POINT (E)
EL: 6,137.1'
LAT: 38° 48' 25.45" N
LON: 104° 41' 41.53" W
RWY END 31 DISPLACED THRESHOLD (E)
EL: 6,134.6'
LAT: 38° 48' 27.98" N
LON: 104° 41' 44.70" W
RWY 31 RPZ (E) INNER WIDTH: 500' OUTER WIDTH: 1,010' LENGTH: 1,700'
FUEL FARM

RUNWAY 13/31 (8,250'X150') (E) TRUE BEARING: 315°05'40.31"
ARP (E)
LAT: 38° 48' 20.94" N
LON: 104° 42' 02.79" W
RWY 31 TDZE (E)
EL: 6,154.7'
LAT: 38° 48' 46.48" N
LON: 104° 42' 08.27" W
COS C 1996 (SACS)
EL: 6,147.8'
LAT: 38° 48' 57.47" N
LON: 104° 42' 41.19" W
RWY END 13 (E)
RWY 13/31 HIGH POINT
EL: 6,173.1'
LAT: 38° 49' 23.36" N
LON: 104° 42' 55.28" W
RWY 35L TDZE (E)
EL: 6,074.6'
LAT: 38° 48' 07.40" N
LON: 104° 42' 57.32" W
RWY END 35L (E)
RWY LOW POINT 17R/35L
EL: 6,045.0'
LAT: 38° 47' 37.77" N
LON: 104° 42' 57.36" W

RUNWAY 17R/35L (11,022'X150') (E) TRUE BEARING: 180°03'24.76"

RWY END 17R (E)
RWY 17R TDZE (E)
RWY 17R/35L HIGH POINT
EL: 6,176.4'
LAT: 38° 49' 26.67" N
LON: 104° 42' 57.22" W
CELL TOWER
RWY 35L RPZ (E) INNER WIDTH: 1,000' OUTER WIDTH: 1,750' LENGTH: 2,500'
RWY 35L APPROACH SURFACE (E) SLOPE 40:1
RWY 35L THRESHOLD SITING SURFACE (E) TYPE 6 SLOPE 30:1
RWY 35L THRESHOLD SITING SURFACE (E) TYPE 5 SLOPE 34:1

LEGEND

LEGEND ITEM	EXISTING
AIRPORT PROPERTY BOUNDARY	
PSFB	
AIRPORT PAVEMENT MARKINGS	
AIRPORT PAVEMENT	
ROAD	
PARKING AREA	
ON-AIRPORT BUILDING	
OFF-AIRPORT BUILDING	
WATER FEATURE	
NAVAID CRITICAL AREA	
PRECISION OBJECT FREE ZONE (POFZ)	
RUNWAY PROTECTION ZONE (RPZ)	
RUNWAY SAFETY AREA (RSA)	
RUNWAY OBJECT FREE AREA (ROFA)	
RUNWAY OBJECT FREE ZONE (ROFZ)	
BUILDING RESTRICTION LINE (BRL 35')	
THRESHOLD SITING SURFACE (TSS)	
APPROACH SURFACE (20:1)	
APPROACH SURFACE (34:1)	
APPROACH SURFACE (50:1/40:1)	
FENCE (6' HEIGHT OR LESS)	
FENCE (8' HEIGHT OR LESS)	
GATE	
TRAVERSEWAY INTERSECTION	
PACS OR SACS	
AIRPORT REFERENCE POINT	
AIR TRAFFIC CONTROL TOWER (ATCT)	
LOCALIZER	
GLIDE SLOPE ANTENNA	
ROTATING BEACON	
AWOS	
RUNWAY END LIGHT	
LLWAS	
RVR	
CELL TOWER	
PAPI	
REIL	
MALSR/ALSF-2	
WIND CONE	
AIRPORT SURVEILLANCE RADAR (ASR)	
AIR TRAFFIC CONTROL TOWER LINE OF SIGHT	

EXISTING AIRPORT FACILITIES LIST

BUILDINGID	DESCRIPTION	HIGHEST ELEVATION (MSL)
1	ARFF TRAINING AREA	6203.0'
2	PETERSON AFB EAST GATE	6243.8'
3	NATIONAL MUSEUM OF WW II AVIATION HANGAR	6188.6'
4	NATIONAL MUSEUM OF WW II AVIATION HANGAR	6206.2'
5	NATIONAL MUSEUM OF WWII AVIATION HANGAR	6206.5'
6	AIRCRAFT RESCUE AND FIRE FIGHTING	6209.7'
7	LOCALIZER BUILDING	6178.2'
8	COS OWNERS ASSOCIATION HANGARS	6181.9'
9	COS OWNERS ASSOCIATION HANGAR	6166.0'
10	COS OWNERS ASSOCIATION HANGARS	6157.1'
11	COS OWNERS ASSOCIATION OFFICE/HANGARS	6153.0'
12	COS OWNERS ASSOCIATION HANGARS	6156.1'
13	COS OWNERS ASSOCIATION HANGARS	6152.3'
14	COS OWNERS ASSOCIATION HANGAR	6177.5'
15	COS OWNERS ASSOCIATION HANGARS	6180.4'
16	COS OWNERS ASSOCIATION HANGARS	6152.6'
17	COS OWNERS ASSOCIATION HANGARS	6151.1'
18	COS OWNERS ASSOCIATION FUEL FARM	6131.5'
19	AIRPORT TRAFFIC CONTROL TOWER	6327.9'
20	COLORADO SPRINGS POLICE HANGAR	6153.5'
21	JC AVIATION CORPORATE HANGAR	6153.8'
22	FEDEX CARGO FACILITY	6136.2'
23	FEDEX CARGO FACILITY	6143.6'
24	FORMER RENTAL CAR SERVICE CENTER	6119.3'
25	COLORADO DIVISION OF WILDLIFE HANGAR	6126.7'
26	JET CENTER T-HANGARS	6124.1'
27	FORMER RENTAL CAR SERVICE CENTER	6115.2'
28	FIVE STAR AVIATION OFFICE/HANGAR	6128.2'
29	FIVE STAR AVIATION HANGARS	6125.2'
30	FIVE STAR AVIATION HANGARS	6113.7'
31	FIVE STAR AVIATION HANGARS	6112.9'
32	FIVE STAR AVIATION HANGARS	6114.5'
33	ASOS	6195.4'
34	COLORADO JET CENTER HANGAR	6140.4'
35	PUMP HOUSE	6101.3'
36	FUEL FARM	6112.1'
37	COLORADO JET CENTER EXECUTIVE TERMINAL/HANGAR	6119.5'
38	CUTTER HANGAR	6145.7'
39	CUTTER FUEL FARM	6084.2'
40	ARG HANGAR	6156.3'
41	CUTTER EXECUTIVE TERMINAL	6121.1'
42	AIRCRAFT RESCUE AND FIREFIGHTING	6207.3'
43	SNC HANGAR	6152.4'
44	SKYWEST MAINTENANCE FACILITY	6139.8'
45	ELECTRICAL VAULT	6134.4'
46	TKC HANGAR	6124.1'
47	SIERRA NEVADA CORPORATION	6090.0'
48	CORDILLERA CORPORATION HANGAR	6106.7'
49	J.H.W. HANGAR	6107.1'
50	J.H.W. HANGARS	6079.2'
51	J.H.W. OFFICE/HANGAR	6081.0'
52	J.H.W. FUEL FARM	6054.8'
53	J.H.W. EXECUTIVE TERMINAL/HANGAR	6084.8'
54	ASR-8	6201.2'
55	J.H.W. HANGARS	6075.8'
56	J.H.W. HANGARS	6072.0'
57	J.H.W. HANGARS	6077.1'
58	J.H.W. HANGARS	6070.9'
59	J.H.W. OFFICE BUILDING	6077.8'
60	J.H.W. HANGARS	6079.6'
61	BROADSTONE HANGAR	6108.9'
62	J.H.W. HANGARS	6080.6'
63	PASSENGER TERMINAL BUILDING	6180.9'
64	EAST TERMINAL UNIT	6149.3'
65	COLORADO JET CENTER FUEL FARM	6127.8'
66	BELLY CARGO BUILDING	6136.1'
67	PARKING STRUCTURE	6115.0'
68	GLYCOL PRETREATMENT FACILITY	6083.6'
69	TOLL PLAZA	6115.4'
70	HERTZ RENTAL CAR SERVICE CENTER	6112.9'
71	HERTZ WASHRACK	6107.8'
72	HERTZ RENTAL CAR SERVICE CENTER	6110.4'
73	ALAMO/NATIONAL RENTAL CAR SERVICE CENTER	6107.4'
74	ALAMO/NATIONAL RENTAL CAR SERVICE CENTER	6113.1'
75	AVIS/BUDGET RENTAL CAR SERVICE CENTER	6106.1'
76	VACANT RENTAL CAR SERVICE CENTER	6102.2'
77	VACANT RENTAL CAR SERVICE CENTER	6101.9'
78	ALAMO/NATIONAL RENTAL CAR SERVICE CENTER	6103.5'
79	ENTERPRISE RENTAL CAR SERVICE CENTER	6104.9'
80	AIRPORT MAINTENANCE FACILITY	6066.4'
81	AIRPORT MAINTENANCE FACILITY	6075.4'
82	AIRPORT LAVATORY BAY	6055.0'
83	AIRPORT STORAGE BUILDING	6063.9'
84	VACANT RENTAL CAR SERVICE CENTER	6091.6'
85	AIRPORT MAINTENANCE FACILITY	6071.8'
86	AIRPORT EMERGENCY COMS TOWER	6104.0'
87	NUSTAR LOGISTICS FUEL TANKS	6037.2'
88	NUSTAR LOGISTICS FUEL TANKS	6029.9'
89	NUSTAR LOGISTICS FUEL TANKS	6036.7'
90	NUSTAR LOGISTICS FUEL TANKS	6028.9'
91	NUSTAR LOGISTICS FUEL TANKS	6036.8'
92	NUSTAR LOGISTICS FUEL TANKS	6034.4'
93	NUSTAR LOGISTICS FUEL TANKS	6025.1'
94	DRENNAN LIFT STATION	6005.0'
95	US FOREST SERVICE AIRTANKER BASE	6134.0'
96	US FOREST SERVICE AIRTANKER BASE	6134.0'
97	NUSTAR FUEL SUPPORT BUILDING	5980.8'
98	US FOREST SERVICE AIRTANKER BASE	6134.0'
99	PUBLIC WORKS MATERIAL HANDLING FACILITY	6043.0'
100	NUSTAR FUEL SUPPORT BUILDING	5966.3'
101	COLORADO INTERSTATE GAS	5945.1'
102	COLORADO INTERSTATE GAS	5958.2'
103	ELECTRICAL SUBSTATION	6089.7'
104	NORTHROP GRUMMAN OFFICE	6110.5'
105	AEROSPACE CORPORATION OFFICE	6115.5'
106	A/DACG FACILITY	6103.7'
107	AEROSPACE CORPORATION OFFICE	6115.5'
108	A/DACG FACILITY	6094.0'
109	LOCALIZER BUILDING	6074.1'
110	FLYWHEEL MULTI-BUILDING OFFICE DEVELOPMENT	6066.6'
112	WATER TANK	6041.4'
113	GRINNELL LIFT STATION	5936.2'
114	AMAZON SORTING FACILITY	6032.2'

SOURCES

* THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2022

NOTES

1. EXISTING CONDITIONS SHOWN AS (E). FUTURE CONDITIONS SHOW ON SHEET 4
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. ALL ROAD ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENTS OF 23' FOR RAILWAYS, 17' FOR INTERSTATE HIGHWAYS, 15' FOR OTHER PUBLIC ROADS AND 10' FOR PRIVATE ROADS

JVIATION®
A WOOLPERT COMPANY
720 S Colorado Blvd ● Suite 1200-S ● Glendale, Colorado 80246
Phone: 303.524.3030 ● Fax: 303.524.3031
● jviation.com ●

COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: K.D.
CH: T.D.
APP: T.D.

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

EXISTING AIRPORT LAYOUT PLAN DRAWING

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: JANUARY 2023

SHEET NO. 3 of 18

DATE 10/2021
7° 39' E ± 0° 22'
ANNUAL RATE OF CHANGE: 0° 6' W
SOURCE: U.S. NOAA
0 400 800 1,200 Feet

RWY 17L THRESHOLD SITING SURFACE (EF) TYPE 5 SLOPE 34:1
RWY 17L APPROACH SURFACE (EF) SLOPE 50:1
RWY 17L THRESHOLD SITING SURFACE (EF) TYPE 6 SLOPE 30:1
RWY 17L RPZ (EF) INNER WIDTH: 1,000' OUTER WIDTH: 1,750' LENGTH: 2,500'
RWY 17R APPROACH SURFACE (F) SLOPE 50:1
RWY 17R RPZ (EF) INNER WIDTH: 1,000' OUTER WIDTH: 1,510' LENGTH: 1,700'
RWY 17R THRESHOLD SITING SURFACE (EF) TYPE 5 SLOPE 20:1
RWY 13 THRESHOLD SITING SURFACE (F) TYPE 5 SLOPE 20:1
RWY 13 APPROACH SURFACE (F) SLOPE 20:1
RWY END 17L (EF) RWY 17L TDZE (EF) RWY HIGH POINT 17L/35R (EF) EL: 6,187.0' LAT: 38° 48' 57.91" N LON: 104° 41' 08.64" W
RWY END 17R (EF) OPT2 RWY 17R TDZE (EF) OPT2 RWY 17R/35L HIGH POINT (EF) OPT2 EL: 6,176.4' LAT: 38° 49' 26.67" N LON: 104° 42' 57.22" W
RWY END 17R (F) OPT1 RWY 17R TDZE (F) OPT1 RWY 17R/35L HIGH POINT (F) OPT1 EL: 6,157.1' LAT: 38° 49' 08.98" N LON: 104° 42' 57.24" W
RWY END 13 (EF) OPT1 RWY 13 TDZE (EF) OPT1 RWY 13/31 HIGH POINT (EF) OPT1 EL: 6,173.1' LAT: 38° 49' 23.36" N LON: 104° 42' 55.28" W
RWY END 13 (EF) OPT2 RWY 13/31 HIGH POINT (F) OPT2 RWY 13 TDZE (F) OPT2 EL: 6,171.3' LAT: 38° 49' 16.45" N LON: 104° 42' 46.47" W
RWY 31 RPZ (EF) INNER WIDTH: 500' OUTER WIDTH: 1,010' LENGTH: 1,700'
RWY 31 DISPLACED THRESHOLD (F) RUNWAY 31 TDZE (F) EL: 6,151.8' (F) LAT: 38° 48' 27.98" N LON: 104° 41' 44.70" W
RWY LOW POINT 13/31 (EF) EL: 6,147.1'
RWY END 31 (F) OPT2 EL: 6,156.8' LAT: 38° 48' 19.77" N LON: 104° 41' 34.24" W
RWY 31 THRESHOLD SITING SURFACE (EF) TYPE 4 SLOPE 20:1
RWY 31 APPROACH SURFACE (EF) SLOPE 34:1
RWY END 35R (EF) RWY LOW POINT 17L/35R (EF) EL: 6,102.7' LAT: 38° 46' 44.51" N LON: 104° 41' 08.87" W
RWY 35R RPZ (F) INNER WIDTH: 1,000' OUTER WIDTH: 1,750' LENGTH: 2,500'
RWY 35R APPROACH SURFACE (EF) SLOPE 50:1
RWY 35R THRESHOLD SITING SURFACE (EF) TYPE 5 SLOPE 34:1
RWY 35R THRESHOLD SITING SURFACE (EF) TYPE 6 SLOPE 30:1
RWY 35R TDZE (EF) EL: 6,112.7' LAT: 38° 47' 14.12" N LON: 104° 41' 08.82" W
RWY END 35L (F) RWY LOW POINT 17R/35L EL: 6,033.1' LAT: 38° 47' 13.06" N LON: 104° 42' 57.39" W
DISPLACED THRESHOLD (F) RWY END 35L EL: 6,037.0' LAT: 38° 47' 20.72" N LON: 104° 42' 57.38" W
RWY 35L RPZ (F) INNER WIDTH: 1,000' OUTER WIDTH: 1,750' LENGTH: 2,500'
RWY 35L THRESHOLD SITING SURFACE (F) TYPE 5 SLOPE 34:1
RWY 35L APPROACH SURFACE (F) SLOPE 50:1
RWY 35L THRESHOLD SITING SURFACE (F) TYPE 6 SLOPE 30:1
RWY 35L TDZE (E) EL: 6,074.6' LAT: 38° 48' 07.40" N LON: 104° 42' 57.32" W
RUNWAY 17L/35R (13,500'X150') (EF) TRUE BEARING: 180°04'38.62"
RUNWAY 17R/35L (11,730'X150') (F OPT1) (13,519'X150') (F OPT2) TRUE BEARING: 180°03'24.76"
RUNWAY 13/31 (10,599'X150') (F OPT1) (10,599'X150') (F OPT2) TRUE BEARING: 135°04'40.57"
ASR TO BE RELOCATED
COS E (SACS) EL: 6,223.6' LAT: 38° 48' 45.75" N LON: 104° 40' 58.59" W
COS D 1996 (PACS) EL: 6,175.8' LAT: 38° 48' 11.70" N LON: 104° 40' 58.59" W
COS C 1996 (SACS) EL: 6,147.8' LAT: 38° 48' 57.47" N LON: 104° 42' 41.19" W
ARP (F) OP2 LAT: 38° 48' 15.36" N LON: 104° 42' 04.47" W
ARP (F) OP1 LAT: 38° 48' 15.57" N LON: 104° 42' 08.49" W
OPTION 1 RUNWAY REMOVAL
OPTION 2 RUNWAY AND TAXIWAY EXTENSION
INTERIM HOLDBARS (F)
ATCT TO BE RELOCATED
RELOCATED ATCT
AIRCRAFT DEICING PAD (F)
EAST AERONAUTICAL DEVELOPMENT
ECONOMY PARKING
RELOCATED CONSOLIDATED AIRFIELD MAINTENANCE FACILITY
DEICE TRUCK PARKING
RENTAL PARKING TO BE RELOCATED
ECONOMY PARKING (F) EXISTING FACILITIES TO BE RELOCATED TO CONRAC
CONRAC (F)
CENTRAL NON-AERONAUTICAL DEVELOPMENT
PEAK INNOVATION PARK NON-AERONAUTICAL DEVELOPMENT
GLIDESLOPE TO BE RELOCATED WITH RUNWAY EXTENSION
PROPOSED VSR
WEST AERONAUTICAL DEVELOPMENT
AIRFIELD MAINTENANCE TO BE RELOCATED
HOLD LINE TO BE REMOVED (F)

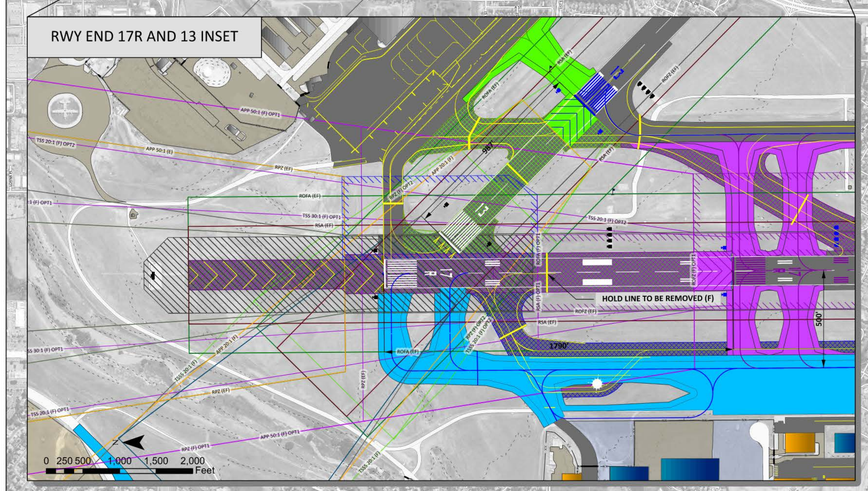
LEGEND

LEGEND ITEM	EXISTING	FUTURE
AIRPORT PROPERTY BOUNDARY		SAME
PSFB		SAME
AIRPORT PAVEMENT MARKINGS		
AIRPORT PAVEMENT		
TO BE REMOVED	N/A	
ROAD		
PARKING AREA		SAME
ON-AIRPORT BUILDING		
OFF-AIRPORT BUILDING		SAME
WATER FEATURE		
NAVAID CRITICAL AREA		
PRECISION OBJECT FREE ZONE (POFZ)		
RUNWAY PROTECTION ZONE (RPZ)		
RUNWAY SAFETY AREA (RSA)		
RUNWAY OBJECT FREE AREA (ROFA)		
RUNWAY OBJECT FREE ZONE (ROFZ)		
BUILDING RESTRICTION LINE (BRL 35')		SAME
THRESHOLD SITING SURFACE (TSS)		
APPROACH SURFACE (20:1)		
APPROACH SURFACE (34:1)		
APPROACH SURFACE (50:1/40:1)		
FENCE (6' HEIGHT OR LESS)		
FENCE (8' HEIGHT OR LESS)		
GATE		
TRAVERSEWAY INTERSECTION		SAME
PACS OR SACS		SAME
AIRPORT CONTROL POINT		
AIRPORT REFERENCE POINT		
AIR TRAFFIC CONTROL TOWER (ATCT)		
LOCALIZER		
ROTATING BEACON		
GLIDE SLOPE ANTENNA		
RVR		SAME
LLWAS		SAME
RUNWAY END LIGHT		
AWOS		
CELL TOWER		SAME
PAPI		
REIL		
MALSR/ALSF-2		
WIND CONE		
AIRPORT SURVEILLANCE RADAR (ASR)	N/A	
AERONAUTICAL	N/A	
NONAERONAUTICAL	N/A	
RELOCATED	N/A	
TO BE RELOCATED	N/A	
AIR TRAFFIC CONTROL TOWER LINE OF SIGHT		

LEGEND FOR OPTIONS TO RESOLVE HOT SPOT 1

LEGEND ITEM	FUTURE
AIRSIDE PAVEMENT - OPTION 1	
PAVEMENT TO BE REMOVED - OPTION 1	
AIRSIDE PAVEMENT - OPTION 2	
PAVEMENT TO BE REMOVED - OPTION 2	
NAVAID CRITICAL AREA - OPTION 1	
RUNWAY PROTECTION STANDARD/THRESHOLD SITING SURFACE - OPTION 1	
RUNWAY PROTECTION STANDARD/THRESHOLD SITING SURFACE - OPTION 2	

RWY END 17R AND 13 INSET



SPONSOR APPROVAL

Gregory S. Phillips, AAE
Gregory S. Phillips, AAE (Jun 21, 2023 10:00 MDT)
NAME
Director of Aviation
TITLE
Jun 21, 2023
DATED

FAA CONDITIONAL APPROVAL

July 17, 2023
SUBJECT TO LETTER DATED
John P Bauer
John P Bauer (Jul 17, 2023 13:12 MDT)
FEDERAL AVIATION ADMINISTRATION
DENVER AIRPORT DISTRICT OFFICE
Jul 17, 2023
DATED
2023-ANM-920-NRA
CASE NO

SOURCES

* THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2022

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)/(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. ALL ROAD ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENTS OF 23' FOR RAILWAYS, 17' FOR INTERSTATE HIGHWAYS, 15' FOR OTHER PUBLIC ROADS AND 10' FOR PRIVATE ROADS
5. DRAWING DEPICTS ALTERNATIVE OPTIONS TO RESOLVE HOT SPOT 1, OPTION 1 BEING THE RELOCATION OF RUNWAY END 17R, OPTION 2 BEING THE RELOCATION OF RUNWAY END 13

FUTURE AIRPORT FACILITIES LIST

BUILDING ID	DESCRIPTION	HIGHEST ELEVATION (MSL)
200	NATIONAL MUSEUM OF WW II AVIATION HANGAR	6206.6'
201	HANGAR	6175.7'
202	FUEL FARM	6112.1'
203	RELOCATED ASR	6127.7'
204	RELOCATED ATCT	6363.5'
205	AIRFIELD MAINTENANCE	6107.4'
206	AIRFIELD MAINTENANCE	6115.5'
207	FLYWHEEL MULTI-BUILDING OFFICE DEVELOPMENT	6050.3'
208	FLYWHEEL MULTI-BUILDING OFFICE DEVELOPMENT	6044.2'
209	FLYWHEEL MULTI-BUILDING OFFICE DEVELOPMENT	6040.2'
5A	NATIONAL MUSEUM OF WWII AVIATION HANGAR	6206.5'
63A	TERMINAL	6180.9'
63B	TERMINAL	6180.9'
63C	TERMINAL	6180.9'

EXISTING AIRPORT FACILITIES LIST

UILDINGI	DESCRIPTION	HIGHEST ELEVATION (MSL)	UILDINGI	DESCRIPTION	HIGHEST ELEVATION (MSL)	UILDINGI	DESCRIPTION	HIGHEST ELEVATION (MSL)	UILDINGI	DESCRIPTION	HIGHEST ELEVATION (MSL)
1	ARFF TRAINING AREA	6203.0'	30	FIVE STAR AVIATION HANGARS	6113.7'	59	J.H.W. OFFICE BUILDING	6077.8'	88	NUSTAR LOGISTICS FUEL TANKS	6029.9'
2	PETERSON AFB EAST GATE	6243.8'	31	FIVE STAR AVIATION HANGARS	6112.9'	60	J.H.W. HANGARS	6079.6'	89	NUSTAR LOGISTICS FUEL TANKS	6036.7'
3	NATIONAL MUSEUM OF WW II AVIATION HANGAR	6188.6'	32	FIVE STAR AVIATION HANGARS	6114.5'	61	BROADSTONE HANGAR	6108.9'	90	NUSTAR LOGISTICS FUEL TANKS	6028.9'
4	NATIONAL MUSEUM OF WW II AVIATION HANGAR	6206.2'	33	ASOS	6195.4'	62	J.H.W. HANGARS	6080.6'	91	NUSTAR LOGISTICS FUEL TANKS	6036.8'
5	NATIONAL MUSEUM OF WWII AVIATION HANGAR	6206.5'	34	COLORADO JET CENTER HANGAR	6140.4'	63	PASSENGER TERMINAL BUILDING	6180.9'	92	NUSTAR LOGISTICS FUEL TANKS	6034.4'
6	AIRCRAFT RESCUE AND FIRE FIGHTING	6209.7'	35	PUMP HOUSE	6101.3'	64	EAST TERMINAL UNIT	6149.3'	93	NUSTAR LOGISTICS FUEL TANKS	6025.1'
7	LOCALIZER BUILDING	6178.2'	36	FUEL FARM	6112.1'	65	COLORADO JET CENTER FUEL FARM	6127.8'	94	DRENNAN LIFT STATION	6005.0'
8	COS OWNERS ASSOCIATION HANGARS	6181.9'	37	COLORADO JET CENTER EXECUTIVE TERMINAL/HANGAR	6119.5'	66	BELLY CARGO BUILDING	6136.1'	95	US FOREST SERVICE AIRTANKER BASE	6134.0'
9	COS OWNERS ASSOCIATION HANGAR	6166.0'	38	CUTTER HANGAR	6145.7'	67	PARKING STRUCTURE	6115.0'	96	US FOREST SERVICE AIRTANKER BASE	6134.0'
10	COS OWNERS ASSOCIATION HANGARS	6157.1'	39	CUTTER FUEL FARM	6084.2'	68	GLYCOL PRETREATMENT FACILITY	6083.6'	97	NUSTAR FUEL SUPPORT BUILDING	5980.8'
11	COS OWNERS ASSOCIATION OFFICE/HANGARS	6153.0'	40	ARG HANGAR	6156.3'	69	TOLL PLAZA	6115.4'	98	US FOREST SERVICE AIRTANKER BASE	6134.0'
12	COS OWNERS ASSOCIATION HANGARS	6156.1'	41	CUTTER EXECUTIVE TERMINAL	6121.1'	70	HERTZ RENTAL CAR SERVICE CENTER	6112.9'	99	PUBLIC WORKS MATERIAL HANDLING FACILITY	6043.0'
13	COS OWNERS ASSOCIATION HANGARS	6152.3'	42	AIRCRAFT RESCUE AND FIREFIGHTING	6207.3'	71	HERTZ WASHRACK	6107.8'	100	NUSTAR FUEL SUPPORT BUILDING	5966.3'
14	COS OWNERS ASSOCIATION HANGAR	6177.5'	43	SNC HANGAR	6152.4'	72	HERTZ RENTAL CAR SERVICE CENTER	6110.4'	101	COLORADO INTERSTATE GAS	5945.1'
15	COS OWNERS ASSOCIATION HANGARS	6180.4'	44	SKYWEST MAINTENANCE FACILITY	6139.8'	73	ALAMO/NATIONAL RENTAL CAR SERVICE CENTER	6107.4'	102	COLORADO INTERSTATE GAS	5958.2'
16	COS OWNERS ASSOCIATION HANGARS	6152.6'	45	ELECTRICAL VAULT	6134.4'	74	ALAMO/NATIONAL RENTAL CAR SERVICE CENTER	6113.1'	103	ELECTRICAL SUBSTATION	6089.7'
17	COS OWNERS ASSOCIATION HANGARS	6151.1'	46	TKC HANGAR	6124.1'	75	AVIS/BUDGET RENTAL CAR SERVICE CENTER	6106.1'	104	NORTHROP GRUMMAN OFFICE	6110.5'
18	COS OWNERS ASSOCIATION FUEL FARM	6131.5'	47	SIERRA NEVADA CORPORATION	6090.0'	76	VACANT RENTAL CAR SERVICE CENTER	6102.2'	105	AEROSPACE CORPORATION OFFICE	6115.5'
19	AIRPORT TRAFFIC CONTROL TOWER	6327.9'	48	CORDILLERA CORPORATION HANGAR	6106.7'	77	VACANT RENTAL CAR SERVICE CENTER	6101.9'	106	A/DACG FACILITY	6103.7'
20	COLORADO SPRINGS POLICE HANGAR	6153.5'	49	J.H.W. HANGAR	6107.1'	78	ALAMO/NATIONAL RENTAL CAR SERVICE CENTER	6103.5'	107	AEROSPACE CORPORATION OFFICE	6115.5'
21	JC AVIATION CORPORATE HANGAR	6153.8'	50	J.H.W. HANGARS	6079.2'	79	ENTERPRISE RENTAL CAR SERVICE CENTER	6104.9'	108	A/DACG FACILITY	6094.0'
22	FEDEX CARGO FACILITY	6136.2'	51	J.H.W. OFFICE/HANGAR	6081.0'	80	AIRPORT MAINTENANCE FACILITY	6066.4'	109	LOCALIZER BUILDING	6074.1'
23	FEDEX CARGO FACILITY	6143.6'	52	J.H.W. FUEL FARM	6054.8'	81	AIRPORT MAINTENANCE FACILITY	6075.4'	110	FLYWHEEL MULTI-BUILDING OFFICE DEVELOPMENT	6066.6'
24	FORMER RENTAL CAR SERVICE CENTER	6119.3'	53	J.H.W. EXECUTIVE TERMINAL/HANGAR	6084.8'	82	AIRPORT LAVATORY BAY	6055.0'	112	WATER TANK	6041.4'
25	COLORADO DIVISION OF WILDLIFE HANGAR	6126.7'	54	ASR-8	6201.2'	83	AIRPORT STORAGE BUILDING	6063.9'	113	GRINNELL LIFT STATION	5936.2'
26	JET CENTER T-HANGARS	6124.1'	55	J.H.W. HANGARS	6075.8'	84	VACANT RENTAL CAR SERVICE CENTER	6091.6'	114	AMAZON SORTING FACILITY	6032.2'
27	FORMER RENTAL CAR SERVICE CENTER	6115.2'	56	J.H.W. HANGARS	6072.0'	85	AIRPORT MAINTENANCE FACILITY	6071.8'	115	PEAK LIFT STATION	5916.2'
28	FIVE STAR AVIATION OFFICE/HANGAR	6128.2'	57	J.H.W. HANGARS	6077.1'	86	AIRPORT EMERGENCY COMS TOWER	6104.0'	116	BRADLEY LIFT STATION	5898.6'
29	FIVE STAR AVIATION HANGARS	6125.2'	58	J.H.W. HANGARS	6070.9'	87	NUSTAR LOGISTICS FUEL TANKS	6037.2'			

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: K.D.
CH: T.D.
APP: T.D.

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

FUTURE AIRPORT LAYOUT PLAN DRAWING

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: JANUARY 2023

SHEET NO. 4 of 18

RWY 31 RPZ (EF)
INNER WIDTH: 500'
OUTER WIDTH: 1,010'
LENGTH: 1,700'

AIRCRAFT DEICING PAD (F)

FENCE TO BE REMOVED (F)

BUILDING 002
TO BE REMOVED

FUTURE FENCE

RELOCATED ATCT (F)

CELL PHONE LOT/TAXI
STAGING AREA

ECONOMY
PARKING (F)

EAST
AERONAUTICAL
DEVELOPMENT

GLYCOL POND

RELOCATED
CONSOLIDATED AIRFIELD
MAINTENANCE FACILITY (F)

POND 202

SUMP

RENTAL PARKING
TO BE RELOCATED TO CONRAC (F)

AUTO PARKING

ECONOMY
PARKING (F)

RENTAL CAR SERVICE ROAD

ARRIVAL ROADWAY

DEPARTURE ROADWAY

MILTON E PROBY PKWY

OLD DRENNAN RD

TWY M

TWY N

TWY G

TWY P

FENCE
TO BE REMOVED

FLIGHT CREW
PARKING

OVERFLOW PARKING
TO BE REMOVED

CONRAC (F)

GLYCOL

GLYCOL
POND

PEAK
INNOVATION PARK (F)

PEAK INNOVATIONS PARKWAY

TERMINAL EXPANSION - PHASE 1

DATE 10/2021
7° 39' E ± 0° 22'
ANNUAL RATE OF CHANGE: 0° 6' W
SOURCE: U.S. NOAA

0 100 200 300 400 Feet

SOURCES

* THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2022

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)/(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88

FUTURE AIRPORT FACILITIES LIST

BUILDING ID	DESCRIPTION	HIGHEST ELEVATION (MSL)
204	RELOCATED ATCT	6363.5'
205	AIRFIELD MAINTENANCE	6107.4'
206	AIRFIELD MAINTENANCE	6115.5'
63A	TERMINAL	6180.9'
63B	TERMINAL	6180.9'
63C	TERMINAL	6180.9'
63D	TERMINAL	6180.9'
63E	TERMINAL	6180.9'
63F	TERMINAL	6180.9'

EXISTING AIRPORT FACILITIES LIST

BUILDING ID	DESCRIPTION	HIGHEST ELEVATION (MSL)
63	PASSENGER TERMINAL BUILDING	6180.9'
64	EAST TERMINAL UNIT	6149.3'
65	COLORADO JET CENTER FUEL FARM	6127.8'
66	BELLY CARGO BUILDING	6136.1'
67	PARKING STRUCTURE	6115.0'
68	GLYCOL PRETREATMENT FACILITY	6083.6'
69	TOLL PLAZA	6115.4'
70	HERTZ RENTAL CAR SERVICE CENTER	6112.9'
71	HERTZ WASHRACK	6107.8'
72	HERTZ RENTAL CAR SERVICE CENTER	6110.4'
73	ALAMO/NATIONAL RENTAL CAR SERVICE CENTER	6107.4'
74	ALAMO/NATIONAL RENTAL CAR SERVICE CENTER	6113.1'
75	AVIS/BUDGET RENTAL CAR SERVICE CENTER	6106.1'

LEGEND

LEGEND ITEM	EXISTING	FUTURE
AIRPORT PROPERTY BOUNDARY		SAME
AIRPORT PAVEMENT MARKINGS		
AIRPORT PAVEMENT		
TO BE REMOVED	N/A	
ROAD		
PARKING AREA		SAME
ON-AIRPORT BUILDING		
WATER FEATURE		SAME
TAXIWAY SAFETY AREA (TSA)	TSA(E)	TSA(F)
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA(E)	TOFA(F)
TAXIWAY EDGE SAFETY MARGIN (TESM)	TESM(E)	TESM(F)
FENCE (8' HEIGHT OR LESS)	x x	x x
AIR TRAFFIC CONTROL TOWER (ATCT)	N/A	
AERONAUTICAL	N/A	
NONAERONAUTICAL	N/A	
RELOCATED	N/A	
TO BE RELOCATED	N/A	

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: K.D.
CH: T.D.
APP: T.D.

ISSUE RECORD

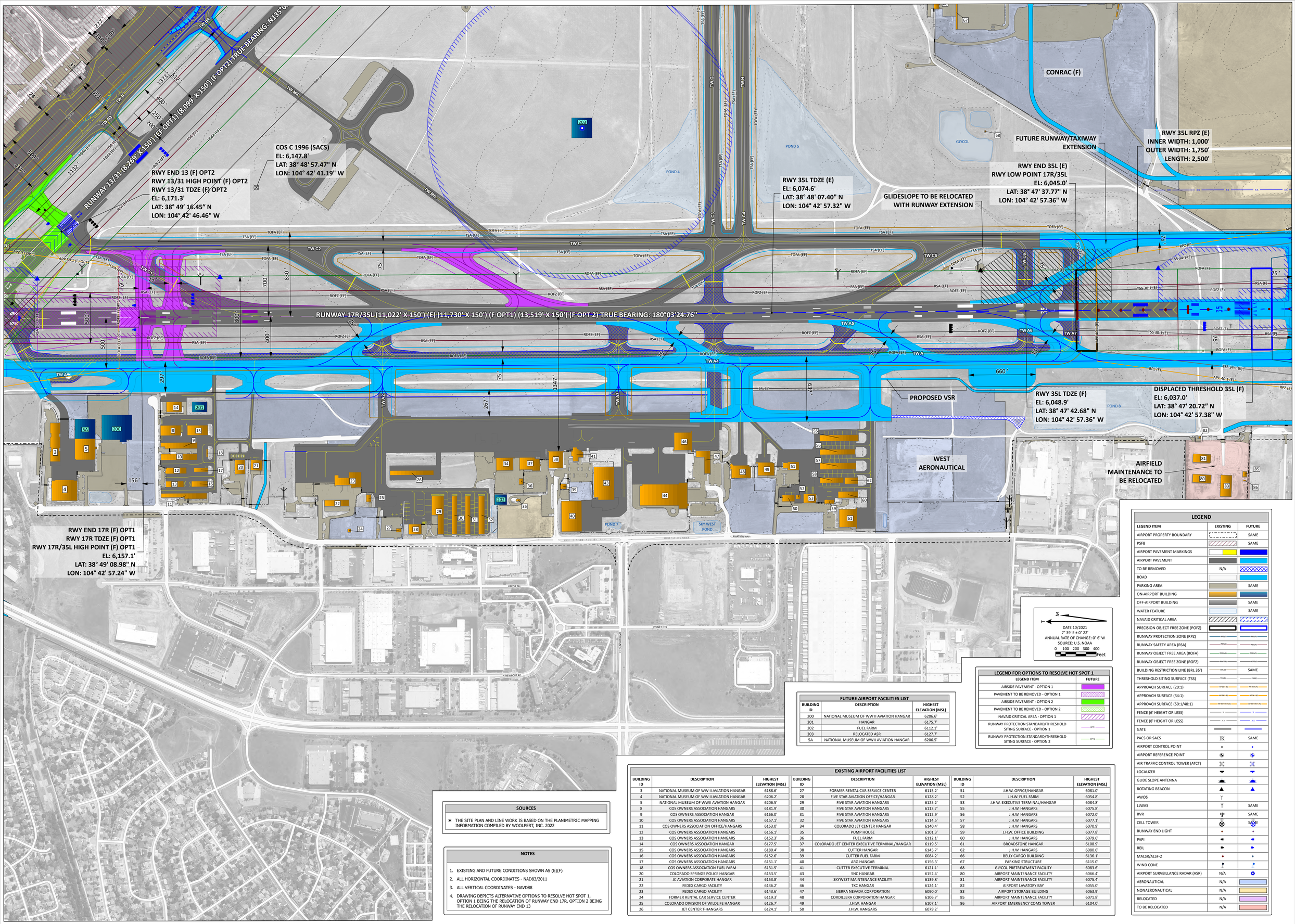
NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

TERMINAL BUILDING AREA PLAN

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: JANUARY 2023

SHEET NO. 5 of 18



LEGEND		
LEGEND ITEM	EXISTING	FUTURE
AIRPORT PROPERTY BOUNDARY		SAME
PSFB		SAME
AIRPORT PAVEMENT MARKINGS		
AIRPORT PAVEMENT		
TO BE REMOVED	N/A	
ROAD		
PARKING AREA		SAME
ON-AIRPORT BUILDING		
OFF-AIRPORT BUILDING		SAME
WATER FEATURE		SAME
NAVAID CRITICAL AREA		
PRECISION OBJECT FREE ZONE (POFZ)		
RUNWAY PROTECTION ZONE (RPZ)		
RUNWAY SAFETY AREA (RSA)		
RUNWAY OBJECT FREE AREA (ROFA)		
RUNWAY OBJECT FREE ZONE (ROFZ)		
BUILDING RESTRICTION LINE (BRL 35')		SAME
THRESHOLD SITING SURFACE (TSS)		
APPROACH SURFACE (20:1)		
APPROACH SURFACE (34:1)		
APPROACH SURFACE (50:1/40:1)		
FENCE (6' HEIGHT OR LESS)		
FENCE (8' HEIGHT OR LESS)		
GATE		
PACS OR SACS		SAME
AIRPORT CONTROL POINT		
AIRPORT REFERENCE POINT		
AIR TRAFFIC CONTROL TOWER (ATCT)		
LOCALIZER		
GLIDE SLOPE ANTENNA		
ROTATING BEACON		
AWOS		
LLWAS		SAME
RVR		SAME
CELL TOWER		SAME
RUNWAY END LIGHT		
PAPI		
REIL		
MALSR/ALSF-2		
WIND CONE		
AIRPORT SURVEILLANCE RADAR (ASR)	N/A	
AERONAUTICAL	N/A	
NONAERONAUTICAL	N/A	
RELOCATED	N/A	
TO BE RELOCATED	N/A	

LEGEND FOR OPTIONS TO RESOLVE HOT SPOT 1	
LEGEND ITEM	FUTURE
AIRSIDE PAVEMENT - OPTION 1	
PAVEMENT TO BE REMOVED - OPTION 1	
AIRSIDE PAVEMENT - OPTION 2	
PAVEMENT TO BE REMOVED - OPTION 2	
NAVAID CRITICAL AREA - OPTION 1	
RUNWAY PROTECTION STANDARD/THRESHOLD SITING SURFACE - OPTION 1	
RUNWAY PROTECTION STANDARD/THRESHOLD SITING SURFACE - OPTION 2	

FUTURE AIRPORT FACILITIES LIST		
BUILDING ID	DESCRIPTION	HIGHEST ELEVATION (MSL)
200	NATIONAL MUSEUM OF WW II AVIATION HANGAR	6206.6'
201	HANGAR	6175.7'
202	FUEL FARM	6112.1'
203	RELOCATED ASR	6127.7'
5A	NATIONAL MUSEUM OF WWII AVIATION HANGAR	6206.5'

SOURCES

* THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2022

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. DRAWING DEPICTS ALTERNATIVE OPTIONS TO RESOLVE HOT SPOT 1, OPTION 1 BEING THE RELOCATION OF RUNWAY END 17R, OPTION 2 BEING THE RELOCATION OF RUNWAY END 13

EXISTING AIRPORT FACILITIES LIST								
BUILDING ID	DESCRIPTION	HIGHEST ELEVATION (MSL)	BUILDING ID	DESCRIPTION	HIGHEST ELEVATION (MSL)	BUILDING ID	DESCRIPTION	HIGHEST ELEVATION (MSL)
3	NATIONAL MUSEUM OF WW II AVIATION HANGAR	6188.6'	27	FORMER RENTAL CAR SERVICE CENTER	6115.2'	51	J.H.W. OFFICE/HANGAR	6081.0'
4	NATIONAL MUSEUM OF WW II AVIATION HANGAR	6206.2'	28	FIVE STAR AVIATION OFFICE/HANGAR	6128.2'	52	J.H.W. FUEL FARM	6054.8'
5	NATIONAL MUSEUM OF WWII AVIATION HANGAR	6206.5'	29	FIVE STAR AVIATION HANGARS	6125.2'	53	J.H.W. EXECUTIVE TERMINAL/HANGAR	6084.8'
8	COS OWNERS ASSOCIATION HANGARS	6181.9'	30	FIVE STAR AVIATION HANGARS	6113.7'	55	J.H.W. HANGARS	6075.8'
9	COS OWNERS ASSOCIATION HANGAR	6166.0'	31	FIVE STAR AVIATION HANGARS	6112.9'	56	J.H.W. HANGARS	6072.0'
10	COS OWNERS ASSOCIATION HANGARS	6157.1'	32	FIVE STAR AVIATION HANGARS	6114.5'	57	J.H.W. HANGARS	6077.1'
11	COS OWNERS ASSOCIATION OFFICE/HANGARS	6153.0'	34	COLORADO JET CENTER HANGAR	6140.4'	58	J.H.W. HANGARS	6070.9'
12	COS OWNERS ASSOCIATION HANGARS	6156.1'	35	PUMP HOUSE	6101.3'	59	J.H.W. OFFICE BUILDING	6077.8'
13	COS OWNERS ASSOCIATION HANGARS	6152.3'	36	FUEL FARM	6112.1'	60	J.H.W. HANGARS	6079.6'
14	COS OWNERS ASSOCIATION HANGAR	6177.5'	37	COLORADO JET CENTER EXECUTIVE TERMINAL/HANGAR	6139.5'	61	BROADSTONE HANGAR	6108.9'
15	COS OWNERS ASSOCIATION HANGARS	6180.4'	38	CUTTER HANGAR	6145.7'	62	J.H.W. HANGARS	6080.6'
16	COS OWNERS ASSOCIATION HANGARS	6152.6'	39	CUTTER FUEL FARM	6084.2'	66	BELLY CARGO BUILDING	6136.1'
17	COS OWNERS ASSOCIATION HANGARS	6151.1'	40	ARG HANGAR	6156.3'	67	PARKING STRUCTURE	6115.0'
18	COS OWNERS ASSOCIATION FUEL FARM	6131.5'	41	CUTTER EXECUTIVE TERMINAL	6121.1'	68	GLYCOL PRETREATMENT FACILITY	6083.6'
20	COLORADO SPRINGS POLICE HANGAR	6153.5'	43	SNC HANGAR	6152.4'	80	AIRPORT MAINTENANCE FACILITY	6066.4'
21	JC AVIATION CORPORATE HANGAR	6153.8'	44	SKYWEST MAINTENANCE FACILITY	6139.8'	81	AIRPORT MAINTENANCE FACILITY	6075.4'
22	FEDEX CARGO FACILITY	6136.2'	46	TKC HANGAR	6124.1'	82	AIRPORT LAVATORY BAY	6055.0'
23	FEDEX CARGO FACILITY	6143.6'	47	SIERRA NEVADA CORPORATION	6090.0'	83	AIRPORT STORAGE BUILDING	6063.9'
24	FORMER RENTAL CAR SERVICE CENTER	6119.3'	48	CORDILLERA CORPORATION HANGAR	6106.7'	85	AIRPORT MAINTENANCE FACILITY	6071.8'
25	COLORADO DIVISION OF WILDLIFE HANGAR	6126.7'	49	J.H.W. HANGAR	6107.1'	86	AIRPORT EMERGENCY COMS TOWER	6104.0'
26	JET CENTER T-HANGARS	6124.1'	50	J.H.W. HANGARS	6079.2'			

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: K.D.
CH: T.D.
APP: T.D.

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

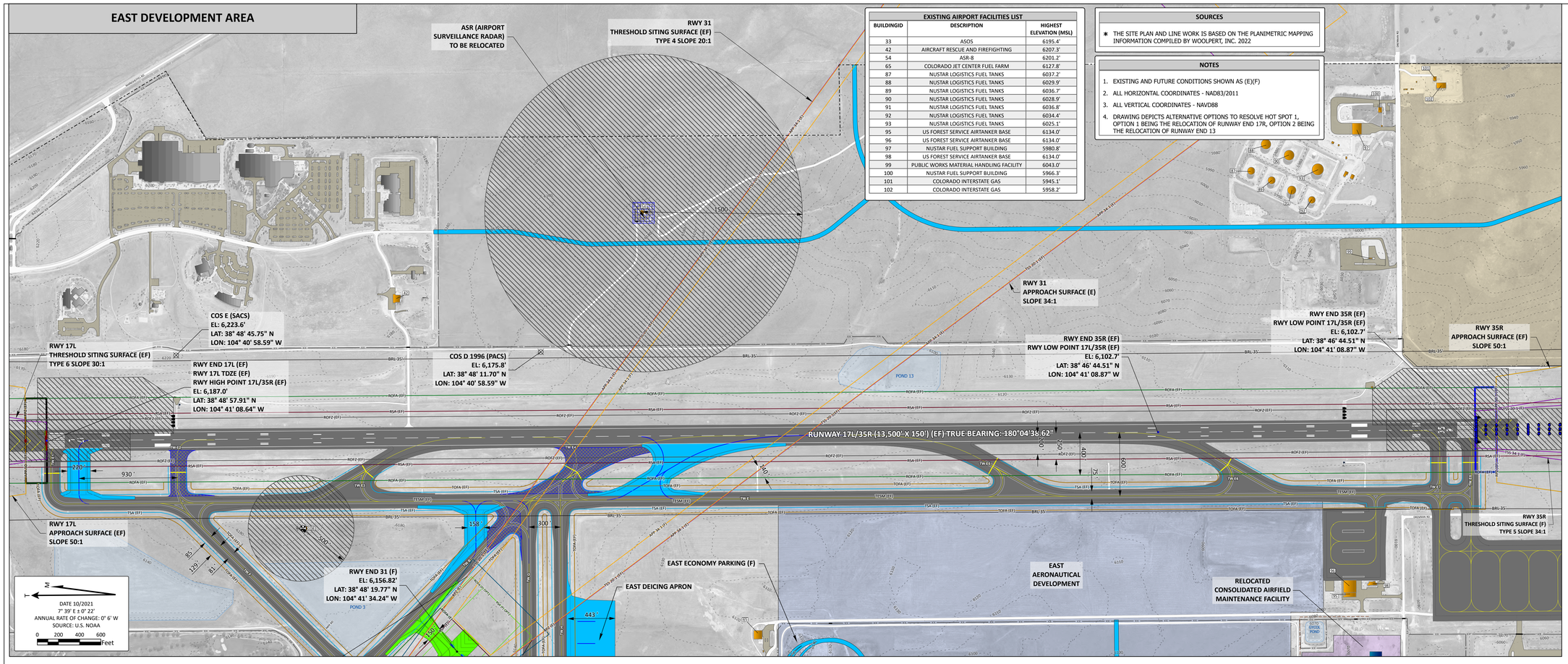
2022 AIRPORT LAYOUT PLAN

WEST DEVELOPMENT AREA PLAN

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: JANUARY 2023

SHEET NO. 6 of 18

EAST DEVELOPMENT AREA


ASR (AIRPORT SURVEILLANCE RADAR) TO BE RELOCATED
RWY 31 THRESHOLD SITING SURFACE (EF) TYPE 4 SLOPE 20:1
1500'
RWY 31 APPROACH SURFACE (E) SLOPE 34:1
COS E (SACS)
EL: 6,223.6'
LAT: 38° 48' 45.75" N
LON: 104° 40' 58.59" W
RWY 17L THRESHOLD SITING SURFACE (EF) TYPE 6 SLOPE 30:1
RWY END 17L (EF)
RWY 17L TDZE (EF)
RWY HIGH POINT 17L/35R (EF)
EL: 6,187.0'
LAT: 38° 48' 57.91" N
LON: 104° 41' 08.64" W
COS D 1996 (PACS)
EL: 6,175.8'
LAT: 38° 48' 11.70" N
LON: 104° 40' 58.59" W
RWY END 35R (EF)
RWY LOW POINT 17L/35R (EF)
EL: 6,102.7'
LAT: 38° 46' 44.51" N
LON: 104° 41' 08.87" W
RWY 35R APPROACH SURFACE (EF) SLOPE 50:1
RUNWAY 17L/35R (13,500' X 150') (EF) TRUE BEARING: 180°04'38.62"
RWY 17L APPROACH SURFACE (EF) SLOPE 50:1
RWY END 31 (F)
EL: 6,156.82'
LAT: 38° 48' 19.77" N
LON: 104° 41' 34.24" W
POND 3
EAST DEICING APPORN
EAST ECONOMY PARKING (F)
EAST AERONAUTICAL DEVELOPMENT
RELOCATED CONSOLIDATED AIRFIELD MAINTENANCE FACILITY
RWY 35R THRESHOLD SITING SURFACE (F) TYPE 5 SLOPE 34:1
POND 13
DATE 10/2021
7° 39' E ± 0° 22'
ANNUAL RATE OF CHANGE: 0° 6' W
SOURCE: U.S. NOAA
0 200 400 600 Feet

EXISTING AIRPORT FACILITIES LIST		
BUILDINGID	DESCRIPTION	HIGHEST ELEVATION (MSL)
33	ASOS	6195.4'
42	AIRCRAFT RESCUE AND FIREFIGHTING	6207.3'
54	ASR-8	6201.2'
65	COLORADO JET CENTER FUEL FARM	6127.8'
87	NUSTAR LOGISTICS FUEL TANKS	6037.2'
88	NUSTAR LOGISTICS FUEL TANKS	6029.9'
89	NUSTAR LOGISTICS FUEL TANKS	6036.7'
90	NUSTAR LOGISTICS FUEL TANKS	6028.9'
91	NUSTAR LOGISTICS FUEL TANKS	6036.8'
92	NUSTAR LOGISTICS FUEL TANKS	6034.4'
93	NUSTAR LOGISTICS FUEL TANKS	6025.1'
95	US FOREST SERVICE AIRTANKER BASE	6134.0'
96	US FOREST SERVICE AIRTANKER BASE	6134.0'
97	NUSTAR FUEL SUPPORT BUILDING	5980.8'
98	US FOREST SERVICE AIRTANKER BASE	6134.0'
99	PUBLIC WORKS MATERIAL HANDLING FACILITY	6043.0'
100	NUSTAR FUEL SUPPORT BUILDING	5966.3'
101	COLORADO INTERSTATE GAS	5945.1'
102	COLORADO INTERSTATE GAS	5958.2'

SOURCES

- THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2022

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. DRAWING DEPICTS ALTERNATIVE OPTIONS TO RESOLVE HOT SPOT 1, OPTION 1 BEING THE RELOCATION OF RUNWAY END 17R, OPTION 2 BEING THE RELOCATION OF RUNWAY END 13

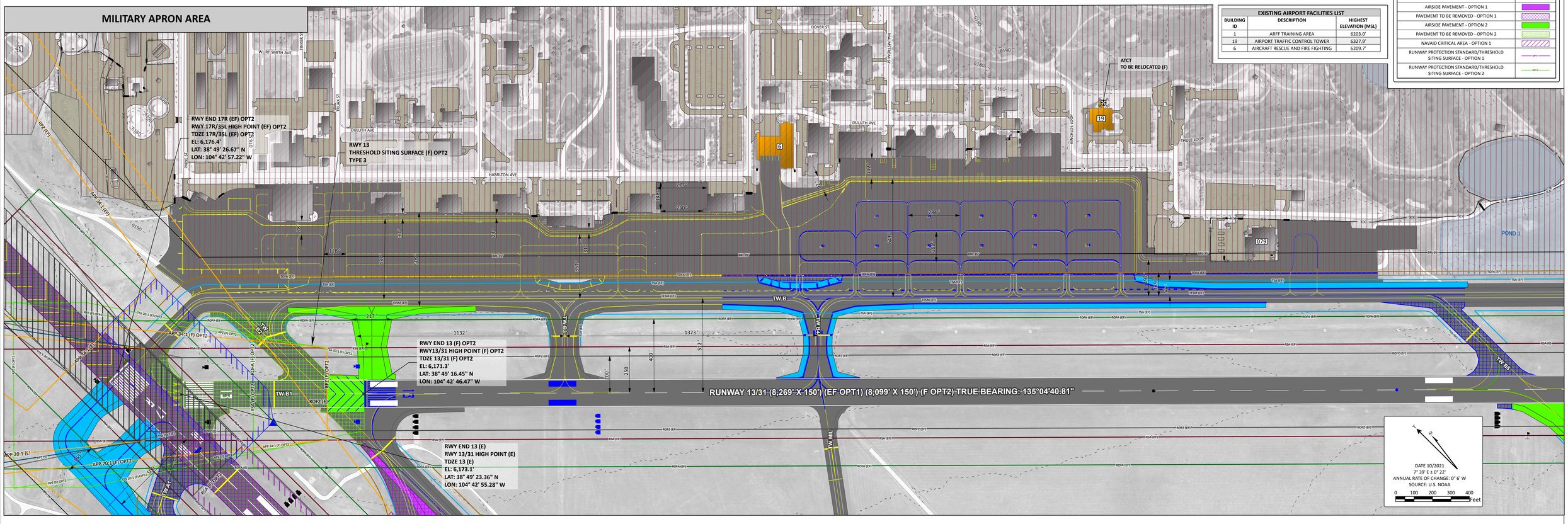
LEGEND

LEGEND ITEM	EXISTING	FUTURE
AIRPORT PROPERTY BOUNDARY		SAME
PSFB		SAME
AIRPORT PAVEMENT MARKINGS		
AIRPORT PAVEMENT		
TO BE REMOVED	N/A	
ROAD		
PARKING AREA		SAME
ON-AIRPORT BUILDING		
OFF-AIRPORT BUILDING		SAME
WATER FEATURE		
NAVAID CRITICAL AREA		
PRECISION OBJECT FREE ZONE (POFZ)		
RUNWAY PROTECTION ZONE (RPZ)		
RUNWAY SAFETY AREA (RSA)		
RUNWAY OBJECT FREE AREA (ROFA)		
RUNWAY OBJECT FREE ZONE (ROFZ)		
BUILDING RESTRICTION LINE (BRL 35')		
TAXIWAY SAFETY AREA (TSA)		
TAXIWAY OBJECT FREE AREA (TOFA)		
TAXIWAY EDGE SAFETY MARGIN (TESM)		
THRESHOLD SITING SURFACE (TSS)		
APPROACH SURFACE (20:1)		
APPROACH SURFACE (34:1)		
APPROACH SURFACE (50:1/40:1)		
FENCE (6' HEIGHT OR LESS)		
FENCE (8' HEIGHT OR LESS)		
GATE		
TRAVERSEWAY INTERSECTION	×	×
PACS OR SACS	⊠	SAME
AIRPORT CONTROL POINT	•	•
AIRPORT REFERENCE POINT		
AIR TRAFFIC CONTROL TOWER (ATCT)		
LOCALIZER		
GLIDE SLOPE ANTENNA		
ROTATING BEACON		
AWOS		
RUNWAY END LIGHT		
LLWAS		SAME
RVR		SAME
CELL TOWER		SAME
PAPI		
REIL		
MALSR/ALSF-2		
WIND CONE		
AIRPORT SURVEILLANCE RADAR (ASR)	N/A	
AERONAUTICAL	N/A	
NONAERONAUTICAL	N/A	
RELOCATED	N/A	
TO BE RELOCATED	N/A	

LEGEND FOR OPTIONS TO RESOLVE HOT SPOT 1

LEGEND ITEM	FUTURE
AIRSIDE PAVEMENT - OPTION 1	
PAVEMENT TO BE REMOVED - OPTION 1	
AIRSIDE PAVEMENT - OPTION 2	
PAVEMENT TO BE REMOVED - OPTION 2	
NAVAID CRITICAL AREA - OPTION 1	
RUNWAY PROTECTION STANDARD/THRESHOLD SITING SURFACE - OPTION 1	
RUNWAY PROTECTION STANDARD/THRESHOLD SITING SURFACE - OPTION 2	

MILITARY APRON AREA


RWY END 17R (EF) OPT2
RWY 17R/35L HIGH POINT (EF) OPT2
TDZE 17R/35L (EF) OPT2
EL: 6,176.4'
LAT: 38° 49' 26.67" N
LON: 104° 42' 57.22" W
RWY 13 THRESHOLD SITING SURFACE (F) OPT2 TYPE 3
ATCT TO BE RELOCATED (F)
RWY END 13 (F) OPT2
RWY13/31 HIGH POINT (F) OPT2
TDZE 13/31 (F) OPT2
EL: 6,171.3'
LAT: 38° 49' 16.45" N
LON: 104° 42' 46.47" W
RUNWAY 13/31 (8,269' X 150') (EF OPT1) (8,099' X 150') (F OPT2) TRUE BEARING: 135°04'40.81"
RWY END 13 (E)
RWY 13/31 HIGH POINT (E)
TDZE 13 (E)
EL: 6,173.1'
LAT: 38° 49' 23.36" N
LON: 104° 42' 55.28" W
POND 1
DATE 10/2021
7° 39' E ± 0° 22'
ANNUAL RATE OF CHANGE: 0° 6' W
SOURCE: U.S. NOAA
0 100 200 300 400 Feet

EXISTING AIRPORT FACILITIES LIST		
BUILDING ID	DESCRIPTION	HIGHEST ELEVATION (MSL)
1	ARFF TRAINING AREA	6203.0'
19	AIRPORT TRAFFIC CONTROL TOWER	6327.9'
6	AIRCRAFT RESCUE AND FIRE FIGHTING	6209.7'

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: K.D.
CH: T.D.
APP: T.D.

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

EAST SIDE DEVELOPMENT AND MILITARY APRON AREA PLAN

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: JANUARY 2023

SHEET NO. 7 of 18

DATE 10/2021
7° 39' E ± 0° 22'
ANNUAL RATE OF CHANGE: 0° 6' W
SOURCE: U.S. NOAA
0 2,000
Feet

CONICAL SURFACE
6,500'
6,450'
6,400'
6,350'
HORIZONTAL SURFACE
EL: 6,337.0'
AIRPORT EL: 6,187.0'
APPROACH SURFACE 34:1
RUNWAY END 17L (EF)
EL: 6,187.0'
ASR (E)
RUNWAY END 35R (EF)
EL: 6,102.7'
APPROACH SURFACE 50:1/40:1
RUNWAY END 31 (F)
EL: 6,156.8'
RUNWAY END 31 (E)
EL: 6,137.1'
PRIMARY SURFACE
RUNWAY END 13 (F)
OPTION 2
EL: 6,171.3'
APPROACH SURFACE OPT 2
50:1/40:1
ASR (F)
RUNWAY END 17R (EF)
OPTION 2
EL: 6,176.4'
APPROACH SURFACE OPT 2
20:1
RUNWAY END 35L (E)
EL: 6,045.0'
RUNWAY END 35L (F)
EL: 6,033.1'

PART 77 IMAGINARY SURFACE DIMENSIONS						
ITEM	DIMENSIONAL STANDARDS (FT)					
	VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
	A	B	A	B		
				C	D	
WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END (FT)	250	500	500	500	1,000	1,000
RADIUS OF HORIZONTAL SURFACE (FT)	5,000	5,000	5,000	10,000	10,000	10,000
APPRAOCH SURFACE WIDTH AT END (FT)	1,250	1,500	2,000	3,500	4,000	16,000
APPROACH SURFACE LENGTH (FT)	5,000	5,000	5,000	10,000	10,000	50,000 *
APPROACH SLOPE (FT)	20:1	20:1	20:1	34:1	34:1	50:1/40:1 *

PART 77 DIMENSIONAL CRITERIA (FUTURE)						
RUNWAY	RUNWAY CLASSIFICATION	APPROACH PROCEDURE	VISIBILITY MINIMUMS	PRIMARY SURFACE WIDTH (FT)	OUTER APPROACH WIDTH (FT)	APPROACH LENGTH (FT)	APPROACH SLOPE
17L	OTHER THAN UTILITY	PRECISION	< 1/4 MILE	1,000	16,000	50,000	50:1/40:1
35R	OTHER THAN UTILITY	PRECISION	1/4 MILE	1,000	16,000	50,000	50:1/40:1
17R	OTHER THAN UTILITY	PRECISION	3/4 MILE	1,000	16,000	50,000	50:1/40:1
35L	OTHER THAN UTILITY	PRECISION	< 1/4 MILE	1,000	16,000	50,000	50:1/40:1
13	OTHER THAN UTILITY	VISUAL	VISUAL	500	1,500	5,000	20:1
31	OTHER THAN UTILITY	NON-PRECISION	1 MILE	500	3,500	10,000	34:1

DRAWING LEGEND

PART 77 SURFACE
- APPROACH SURFACE
- CONICAL SURFACE
- HORIZONTAL SURFACE
- PRIMARY SURFACE
- TRANSITIONAL SURFACE

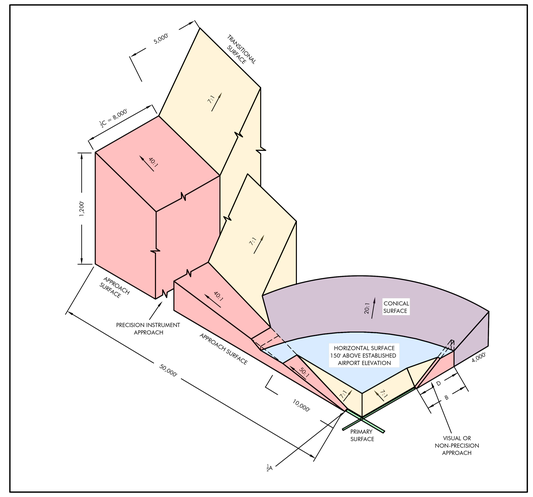
AIRPORT BOUNDARY
- EXISTING

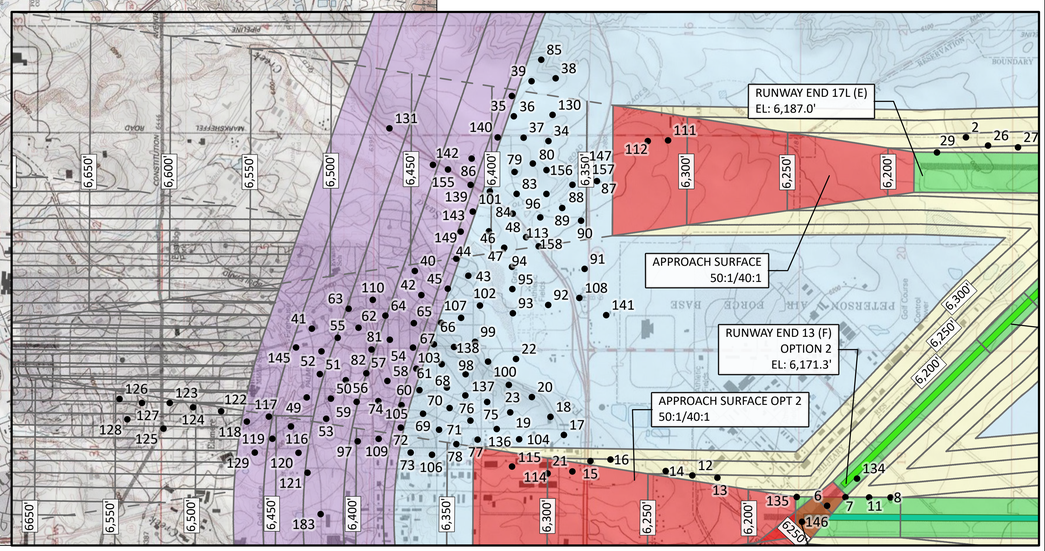
SOURCES

* THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2022

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. FILTERED OBSTRUCTIONS LEFT UNLABELED FOR MAP CLARITY DUE TO PROXIMITY TO MORE CRITICAL LABELED OBSTRUCTIONS
5. ALL ROAD ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENTS OF 23' FOR RAILWAYS, 17' FOR INTERSTATE HIGHWAYS, 15' FOR OTHER PUBLIC ROADS AND 10' FOR PRIVATE ROADS
6. OBSTRUCTION POINTS ARE FOUND ON PAGE 10
7. DRAWING DEPICTS ALTERNATIVE OPTIONS TO RESOLVE HOT SPOT 1, OPTION 1 BEING THE RELOCATION OF RUNWAY END 17R, OPTION 2 BEING THE RELOCATION OF RUNWAY END 13





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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT
(COS)
COLORADO SPRINGS, CO

DES: K.D.
DR: S.C.
CH: T.D.
APP: T.D.

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

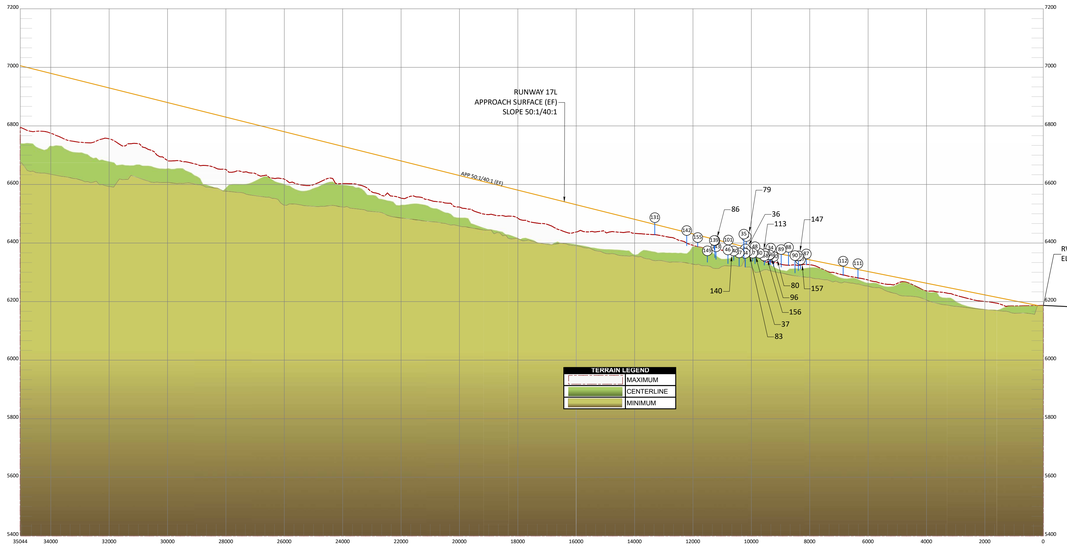
2022 AIRPORT LAYOUT PLAN

AIRPORT FUTURE AIRSPACE DRAWING

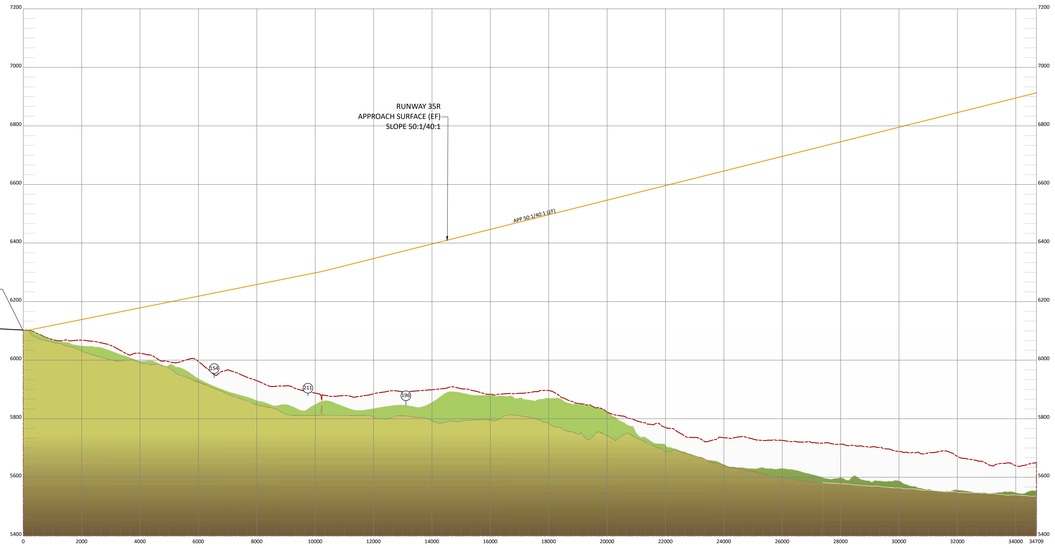
AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: JANUARY 2023

AIRPORT ELEVATION: 6,187.0'

RUNWAY 17L/35R

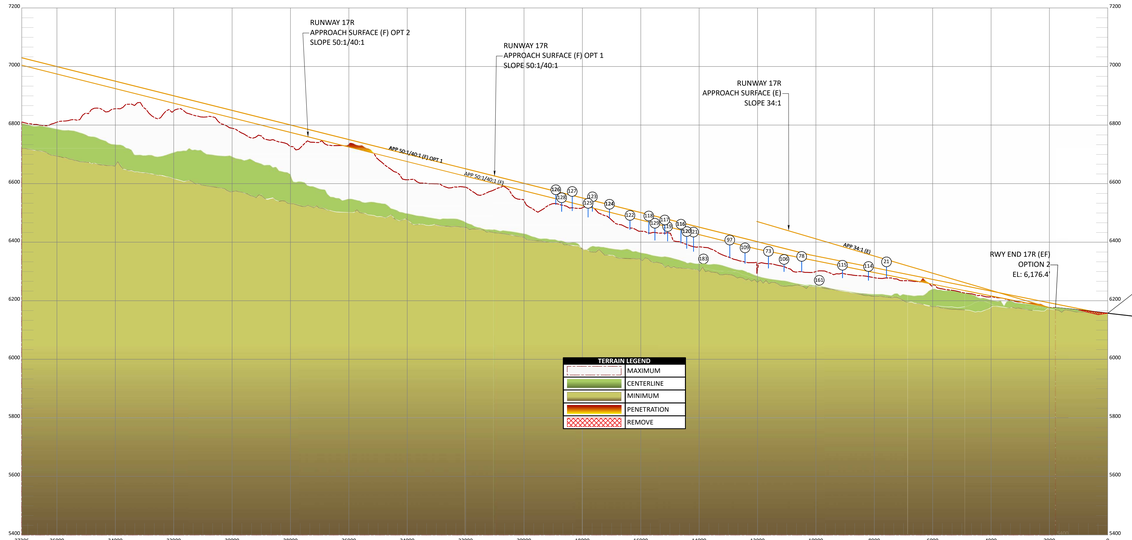


RUNWAY 17L/35R CENTERLINE PROFILE
EFFECTIVE EXISTING AND FUTURE GRADIENT: 0.62%



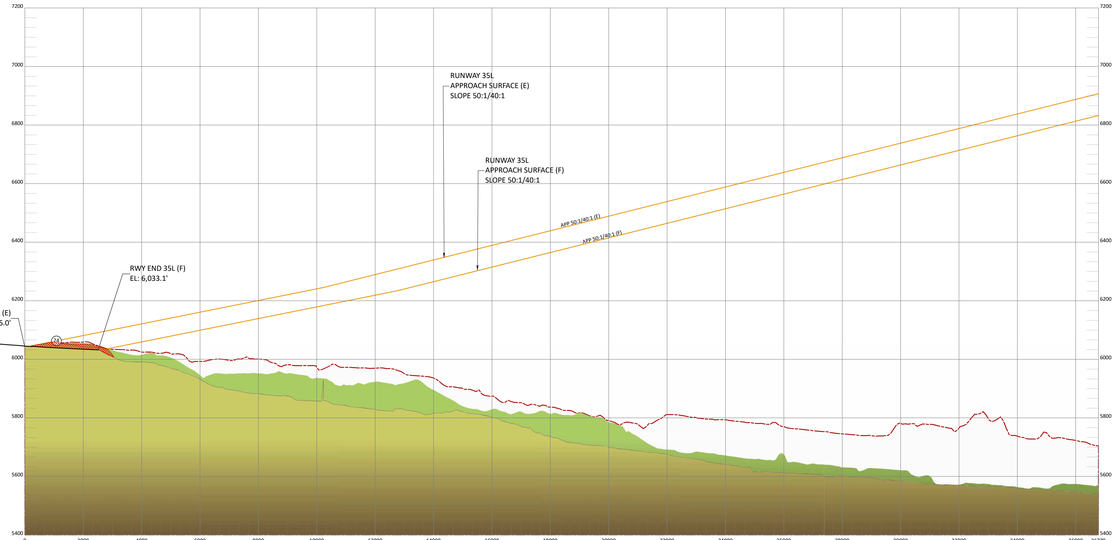
PROFILE SCALE
HORIZONTAL : 1 INCH = 2,000'
VERTICAL: 1 INCH = 200'

RUNWAY 17R/35L



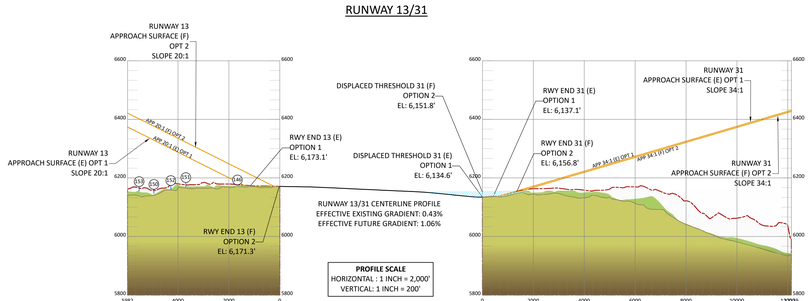
RWY END 17R (F)
OPTION 1
EL: 6,157.1'

RUNWAY 17R/35L CENTERLINE PROFILE
EFFECTIVE EXISTING GRADIENT: 1.90%
EFFECTIVE FUTURE GRADIENT: 0.18%



PROFILE SCALE
HORIZONTAL : 1 INCH = 2,000'
VERTICAL: 1 INCH = 200'

RUNWAY 13/31



RUNWAY 13/31 CENTERLINE PROFILE
EFFECTIVE EXISTING GRADIENT: 0.43%
EFFECTIVE FUTURE GRADIENT: 1.06%

PROFILE SCALE
HORIZONTAL : 1 INCH = 2,000'
VERTICAL: 1 INCH = 200'

NOTES

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3. ALL VERTICAL COORDINATES - NAVD88
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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: S.C.
DR: S.C.
CH: T.D.
APP: T.D.

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

AIRPORT AIRSPACE PROFILE

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: DECEMBER 2022

SHEET NO. 9 of 19

APPROACH AIRSPACE OBSTRUCTION DATA TABLE

RUNWAY END	REF #	OBJECT TYPE	GROUND SURFACE ELEVATION (MSL)	ABOVE GROUND LEVEL (AGL)	TOP OF OBJECT ELEVATION (MSL)	SURFACE PENETRATION (F)	DISPOSITION
17R	21	TREE	6,278.2'	54.3'	6,332.5'	44.9'	REMOVE
17L	35	TANK	6,345.3'	68.4'	6,413.7'	26.1'	MARK/LIGHT
17R	73	TREE	6,311.1'	57.3'	6,368.3'	0.1'	REMOVE
17R	78	TREE	6,298.7'	52.4'	6,351.1'	5.6'	REMOVE
17L	79	TREE	6,380.2'	25.3'	6,405.5'	19.6'	REMOVE
17L	87	TREE	6,325.8'	20.2'	6,346.0'	1.1'	REMOVE
17L	88	TREE	6,323.3'	45.2'	6,368.5'	11.5'	REMOVE
17R	97	TREE	6,346.7'	60.4'	6,407.1'	7.8'	REMOVE
17L	111	POLE	6,278.6'	34.2'	6,312.8'	3.2'	MARK/LIGHT
17L	112	POLE	6,289.0'	32.3'	6,321.3'	1.7'	MARK/LIGHT
17R	114	TREE	6,269.6'	47.0'	6,316.6'	16.6'	REMOVE
17R	115	TREE	6,278.0'	43.0'	6,321.0'	3.3'	REMOVE
17R	116	TREE	6,396.8'	64.3'	6,461.1'	20.3'	REMOVE
17R	117	TREE	6,426.5'	49.1'	6,475.5'	20.9'	REMOVE
17R	118	TREE	6,427.4'	61.8'	6,489.2'	20.9'	REMOVE
17R	119	TREE	6,403.7'	49.2'	6,452.9'	0.6'	REMOVE
17R	120	TREE	6,378.6'	57.4'	6,436.0'	0.0'	REMOVE
17R	121	TREE	6,368.3'	65.9'	6,434.2'	3.9'	REMOVE
17R	122	TREE	6,443.0'	48.2'	6,491.2'	6.9'	REMOVE
17R	123	TREE	6,505.5'	49.1'	6,554.6'	38.3'	REMOVE
17R	124	TREE	6,480.9'	48.3'	6,529.2'	27.4'	REMOVE
17R	125	TREE	6,485.8'	46.6'	6,532.4'	12.3'	REMOVE
17R	126	TREE	6,528.3'	50.4'	6,578.7'	31.1'	REMOVE
17R	127	TREE	6,507.2'	65.7'	6,572.9'	39.3'	REMOVE
17R	128	TREE	6,505.3'	46.2'	6,551.4'	8.7'	REMOVE
17R	129	TREE	6,406.8'	57.6'	6,464.4'	1.1'	REMOVE
17L	131	POLE	6,428.2'	41.8'	6,470.0'	6.3'	MARK/LIGHT
17L	139	PUBLIC ROAD	6,377.6'	14.5'	6,392.1'	-20.9'	NONE
17L	140	PUBLIC ROAD	6,340.8'	15.4'	6,356.2'	-40.1'	NONE
17R	183	PUBLIC ROAD	6,327.5'	15.0'	6,342.5'	-79.5'	NONE
17L	155	PUBLIC ROAD	6,387.1'	15.0'	6,402.1'	-25.0'	NONE
17L	156	PUBLIC ROAD	6,328.1'	15.0'	6,343.1'	-26.9'	NONE
17L	157	PUBLIC ROAD	6,311.3'	15.0'	6,326.3'	-22.6'	NONE

PRIMARY AIRSPACE OBSTRUCTION DATA TABLE

RUNWAY	REF #	OBJECT TYPE	GROUND SURFACE ELEVATION (MSL)	ABOVE GROUND LEVEL (AGL)	TOP OF OBJECT ELEVATION (MSL)	SURFACE PENETRATION (F)	DISPOSITION
17L/35R	1	GROUND	6,121.8'	0.0'	6,121.8'	0.0'	NONE
17R/35L	4	FENCE	6,043.2'	2.4'	6,045.6'	0.1'	NONE
17R/35L	5	GROUND	6,045.0'	0.0'	6,045.0'	0.3'	LOWER
17R/35L	6	GROUND	6,171.2'	0.0'	6,171.2'	0.3'	LOWER
17R/35L	7	GROUND	6,166.8'	0.0'	6,166.8'	1.0'	LOWER
17R/35L	8	GROUND	6,152.9'	0.0'	6,152.9'	0.0'	NONE
17R/35L	9	GROUND	6,097.0'	0.0'	6,097.0'	0.1'	LOWER
17R/35L	10	GROUND	6,089.9'	0.0'	6,089.9'	0.2'	LOWER
17R/35L	11	GROUND	6,159.0'	0.0'	6,159.0'	0.0'	NONE
17R/35L	24	GROUND	6,062.7'	0.0'	6,062.7'	22.4'	LOWER
17L/35R	29	GROUND	6,185.3'	0.0'	6,185.3'	0.0'	NONE
17L/35R	30	GROUND	6,170.4'	0.0'	6,170.4'	0.9'	LOWER
17L/35R	31	GROUND	6,166.5'	0.0'	6,166.5'	0.3'	LOWER
17L/35R	32	BUILDING	6,102.6'	11.5'	6,114.1'	6.5'	MARK/LIGHT
17L/35R	33	SIGN	6,167.2'	4.0'	6,171.1'	1.6'	FIXED BY FUNCTION
17L/35R	132	SIGN	6,146.6'	2.3'	6,148.9'	0.5'	FIXED BY FUNCTION
17R/35L	133	AIRFIELD LIGHT	6,050.9'	4.0'	6,054.9'	0.4'	FIXED BY FUNCTION
13/31	134	AIRFIELD LIGHT	6,168.0'	4.0'	6,172.0'	1.4'	FIXED BY FUNCTION
17R/35L	135	POLE	6,174.6'	2.1'	6,176.7'	0.3'	MARK/LIGHT
17L/35R	144	SIGN	6,102.1'	2.7'	6,104.8'	0.9'	FIXED BY FUNCTION
17R/35L	146	REIL	6,175.0'	1.5'	6,176.5'	0.1'	FIXED BY FUNCTION
17R/35L	148	GLIDE SCOPE	6,048.2'	45.2'	6,093.4'	41.4'	FIXED BY FUNCTION

TRANSITIONAL AIRSPACE OBSTRUCTION DATA TABLE

RUNWAY	REF #	OBJECT TYPE	GROUND SURFACE ELEVATION (MSL)	ABOVE GROUND LEVEL (AGL)	TOP OF OBJECT ELEVATION (MSL)	SURFACE PENETRATION (F)	DISPOSITION
17L/35R	2	FENCE	6,229.8'	8.0'	6,237.8'	2.2'	NONE
17L/35R	3	GROUND	6,114.3'	0.0'	6,114.3'	0.6'	LOWER
17R/35L	12	POLE	6,212.8'	39.4'	6,252.2'	5.6'	MARK/LIGHT
17R/35L	13	TREE	6,213.1'	34.6'	6,247.6'	7.7'	REMOVE
17R/35L	14	TREE	6,246.5'	21.7'	6,268.3'	7.4'	REMOVE
17R/35L	15	TREE	6,269.7'	53.9'	6,323.7'	31.6'	REMOVE
17R/35L	16	TREE	6,266.9'	35.2'	6,302.1'	3.5'	REMOVE
17L/35R	26	GROUND	6,204.3'	0.0'	6,204.3'	0.3'	LOWER
17L/35R	27	GROUND	6,195.2'	0.0'	6,195.2'	0.5'	LOWER
17L/35R	28	GROUND	6,174.3'	0.0'	6,174.3'	0.4'	LOWER
17R/35L	161	PUBLIC ROAD	6,254.5'	15.0'	6,269.5'	-64.5'	NONE
17R/35L	256	ASR (F)	6,111.1'	16.6'	6,127.7'	-163.0'	MARK/LIGHT

HORIZONTAL AIRSPACE OBSTRUCTION DATA TABLE

REF #	OBJECT TYPE	GROUND SURFACE ELEVATION (MSL)	ABOVE GROUND LEVEL (AGL)	TOP OF OBJECT ELEVATION (MSL)	SURFACE PENETRATION (F)	DISPOSITION
17	TREE	6,296.3'	49.5'	6,345.7'	8.7'	REMOVE
18	BUILDING	6,313.4'	25.3'	6,338.7'	1.7'	MARK/LIGHT
19	TREE	6,330.8'	60.9'	6,391.7'	54.7'	REMOVE
20	TREE	6,311.4'	59.3'	6,370.7'	33.7'	REMOVE
22	TREE	6,287.0'	53.2'	6,340.1'	3.1'	REMOVE
23	TREE	6,316.6'	43.6'	6,360.2'	23.2'	REMOVE
34	POLE	6,326.6'	39.4'	6,366.0'	29.0'	MARK/LIGHT
36	BUILDING	6,317.9'	44.9'	6,362.9'	25.9'	MARK/LIGHT
37	SIGN	6,338.0'	10.8'	6,348.8'	11.8'	MARK/LIGHT
38	TREE	6,330.7'	19.1'	6,349.8'	12.8'	REMOVE
39	FENCE	6,348.4'	7.7'	6,356.1'	19.1'	NONE
43	TREE	6,319.8'	63.1'	6,383.0'	46.0'	REMOVE
46	BUILDING	6,329.9'	29.8'	6,359.8'	22.8'	MARK/LIGHT
47	BUILDING	6,321.5'	28.2'	6,349.7'	12.7'	MARK/LIGHT
48	POLE	6,329.4'	41.4'	6,370.7'	33.7'	MARK/LIGHT
60	TREE	6,382.7'	47.2'	6,429.9'	92.9'	REMOVE
66	TREE	6,325.8'	53.0'	6,378.8'	41.8'	REMOVE
67	TREE	6,367.4'	43.2'	6,410.6'	73.6'	REMOVE
68	TREE	6,371.6'	58.8'	6,430.4'	93.4'	REMOVE
69	TREE	6,349.7'	49.6'	6,399.3'	62.3'	REMOVE
70	TREE	6,337.1'	52.2'	6,389.3'	52.3'	REMOVE
71	TREE	6,323.0'	60.9'	6,384.0'	47.0'	REMOVE
73	TREE	6,311.1'	57.3'	6,368.3'	31.3'	REMOVE
75	TREE	6,350.4'	59.6'	6,410.0'	73.0'	REMOVE
76	TREE	6,323.1'	64.6'	6,387.7'	50.7'	REMOVE
77	TREE	6,319.6'	38.1'	6,357.7'	20.7'	REMOVE
78	TREE	6,298.7'	52.4'	6,351.1'	14.1'	REMOVE
79	TREE	6,380.2'	25.3'	6,405.5'	68.5'	REMOVE
80	GROUND	6,348.4'	0.0'	6,348.4'	11.4'	LOWER
83	FENCE	6,351.5'	3.5'	6,354.9'	17.9'	NONE
84	SIGN	6,348.7'	-0.5'	6,348.2'	11.2'	MARK/LIGHT
85	GROUND	6,340.5'	0.0'	6,340.5'	3.5'	LOWER
87	TREE	6,325.8'	20.2'	6,346.0'	9.0'	REMOVE
88	TREE	6,323.3'	45.2'	6,368.5'	31.5'	REMOVE
89	BUILDING	6,317.9'	43.2'	6,361.1'	24.1'	MARK/LIGHT
90	TREE	6,297.8'	42.6'	6,340.5'	3.5'	REMOVE
91	TREE	6,292.8'	48.6'	6,341.5'	4.5'	REMOVE
92	TREE	6,298.9'	38.6'	6,337.5'	0.5'	REMOVE
93	TREE	6,302.2'	38.0'	6,340.2'	3.2'	REMOVE
94	BUILDING	6,317.3'	31.0'	6,348.3'	11.3'	MARK/LIGHT
95	BUILDING	6,314.1'	31.1'	6,345.3'	8.3'	MARK/LIGHT
96	POLE	6,337.1'	5.0'	6,342.1'	5.1'	MARK/LIGHT
98	TREE	6,347.3'	42.7'	6,390.0'	53.0'	REMOVE
99	TREE	6,310.1'	47.3'	6,357.4'	20.4'	REMOVE
100	TREE	6,307.1'	38.9'	6,346.0'	9.0'	REMOVE
101	TREE	6,371.7'	21.8'	6,393.4'	56.4'	REMOVE
102	TREE	6,309.4'	58.8'	6,368.2'	31.2'	REMOVE
103	TREE	6,385.6'	51.1'	6,436.6'	99.6'	REMOVE
104	BUILDING	6,313.5'	36.7'	6,350.2'	13.2'	MARK/LIGHT
106	TREE	6,300.0'	40.8'	6,340.8'	3.8'	REMOVE
107	TREE	6,312.9'	63.0'	6,375.9'	38.9'	REMOVE
108	TREE	6,294.4'	44.6'	6,339.0'	2.0'	REMOVE
113	SIGN	6,335.0'	12.0'	6,347.0'	10.0'	MARK/LIGHT
130	SIGN	6,319.9'	17.2'	6,337.2'	0.2'	MARK/LIGHT
136	PUBLIC ROAD	6,323.8'	14.7'	6,338.4'	1.4'	NONE
137	PUBLIC ROAD	6,341.2'	15.3'	6,356.5'	19.5'	NONE
138	PUBLIC ROAD	6,339.8'	15.2'	6,355.0'	18.0'	NONE
141	TOWER	6,276.6'	80.6'	6,357.2'	20.2'	MARK/LIGHT
147	POLE	6,306.0'	33.5'	6,339.5'	2.5'	MARK/LIGHT
161	PUBLIC ROAD	6,254.5'	15.0'	6,269.5'	-67.5'	NONE
156	PUBLIC ROAD	6,328.1'	15.0'	6,343.1'	6.1'	NONE
157	PUBLIC ROAD	6,311.3'	15.0'	6,326.3'	-10.7'	NONE
158	PUBLIC ROAD	6,324.2'	15.0'	6,339.2'	2.2'	NONE
255	ASR (E)	6,184.7'	16.6'	6,201.3'	-135.7'	MARK/LIGHT

CONICAL AIRSPACE OBSTRUCTION DATA TABLE

REF #	OBJECT TYPE	GROUND SURFACE ELEVATION (MSL)	ABOVE GROUND LEVEL (AGL)	TOP OF OBJECT ELEVATION (MSL)	SURFACE PENETRATION (F)	DISPOSITION
35	TANK	6,345.3'	68.4'	6,413.7'	72.3'	MARK/LIGHT
40	TREE	6,333.1'	71.2'	6,404.3'	19.6'	REMOVE
41	TREE	6,447.2'	41.1'	6,488.3'	5.5'	REMOVE
42	TREE	6,325.8'	62.1'	6,387.9'	20.6'	REMOVE
44	TREE	6,328.0'	56.5'	6,384.5'	43.5'	REMOVE
45	TREE	6,322.0'	56.1'	6,378.0'	39.2'	REMOVE
49	TREE	6,413.3'	64.1'	6,477.4'	13.9'	REMOVE
50	TREE	6,392.5'	58.3'	6,450.9'	16.9'	REMOVE
51	TREE	6,431.7'	59.8'	6,491.5'	36.1'	REMOVE
52	TREE	6,449.6'	50.5'	6,500.1'	38.0'	REMOVE
53	TREE	6,382.6'	53.4'	6,436.0'	2.0'	REMOVE
54	TREE	6,397.9'	44.8'	6,442.8'	86.9'	REMOVE
55	TREE	6,442.3'	48.4'	6,490.7'	42.1'	REMOVE
56	TREE	6,400.3'	58.3'	6,458.6'	36.3'	REMOVE
57	TREE	6,407.6'	52.6'	6,460.2'	59.7'	REMOVE
58	TREE	6,396.2'	54.9'	6,451.1'	78.4'	REMOVE
59	TREE	6,376.6'	45.3'	6,421.9'	20.0'	REMOVE
61	BUILDING	6,390.0'	29.0'	6,419.0'	75.5'	MARK/LIGHT
62	TREE	6,420.3'	53.4'	6,473.7'	45.6'	REMOVE
63	TREE	6,408.7'	48.5'	6,457.3'	9.8'	REMOVE
64	TREE	6,377.4'	61.4'	6,438.8'	37.4'	REMOVE
65	TREE	6,359.7'	55.6'	6,415.3'	50.5'	REMOVE
72	TREE	6,344.5'	53.5'	6,398.0'	57.0'	REMOVE
74	TREE	6,372.9'	47.9'	6,420.8'	44.7'	REMOVE
81	TREE	6,399.7'	37.7'	6,437.4'	51.0'	REMOVE
82	TREE	6,417.9'	52.4'	6,470.3'	66.4'	REMOVE
86	TREE	6,350.3'	41.6'	6,391.9'	28.6'	REMOVE
97	TREE	6,346.7'	60.4'	6,407.1'	16.9'	REMOVE
105	TREE	6,362.2'	34.3'	6,396.5'	49.6'	REMOVE
109	TREE	6,327.0'	53.4'	6,380.3'	15.2'	REMOVE
110	TREE	6,377.4'	56.4'	6,433.8'	11.2'	REMOVE
139	PUBLIC ROAD	6,377.6'	14.5'	6,392.1'	38.1'	NONE
140	PUBLIC ROAD	6,340.8'	15.4'	6,356.2'	14.9'	NONE
142	SIGN	6,390.3'	35.6'	6,426.0'	19.6'	MARK/LIGHT
143	BUILDING	6,344.4'	25.9'	6,370.3'	29.7'	MARK/LIGHT
145	TOWER	6,451.9'	62.5'	6,514.4'	20.7'	MARK/LIGHT
149	BUILDING	6,334.9'	21.9'	6,356.7'	10.0'	MARK/LIGHT
183	PUBLIC ROAD	6,327.5'	15.0'	6,342.5'	-85.8'	NONE
155	PUBLIC ROAD	6,387.1'	15.0'	6,402.1'	15.3'	NONE

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT
(COS)
COLORADO SPRINGS, CO

DES: K.D.
DR: K.D.
CH: T.D.
APP: T.D.

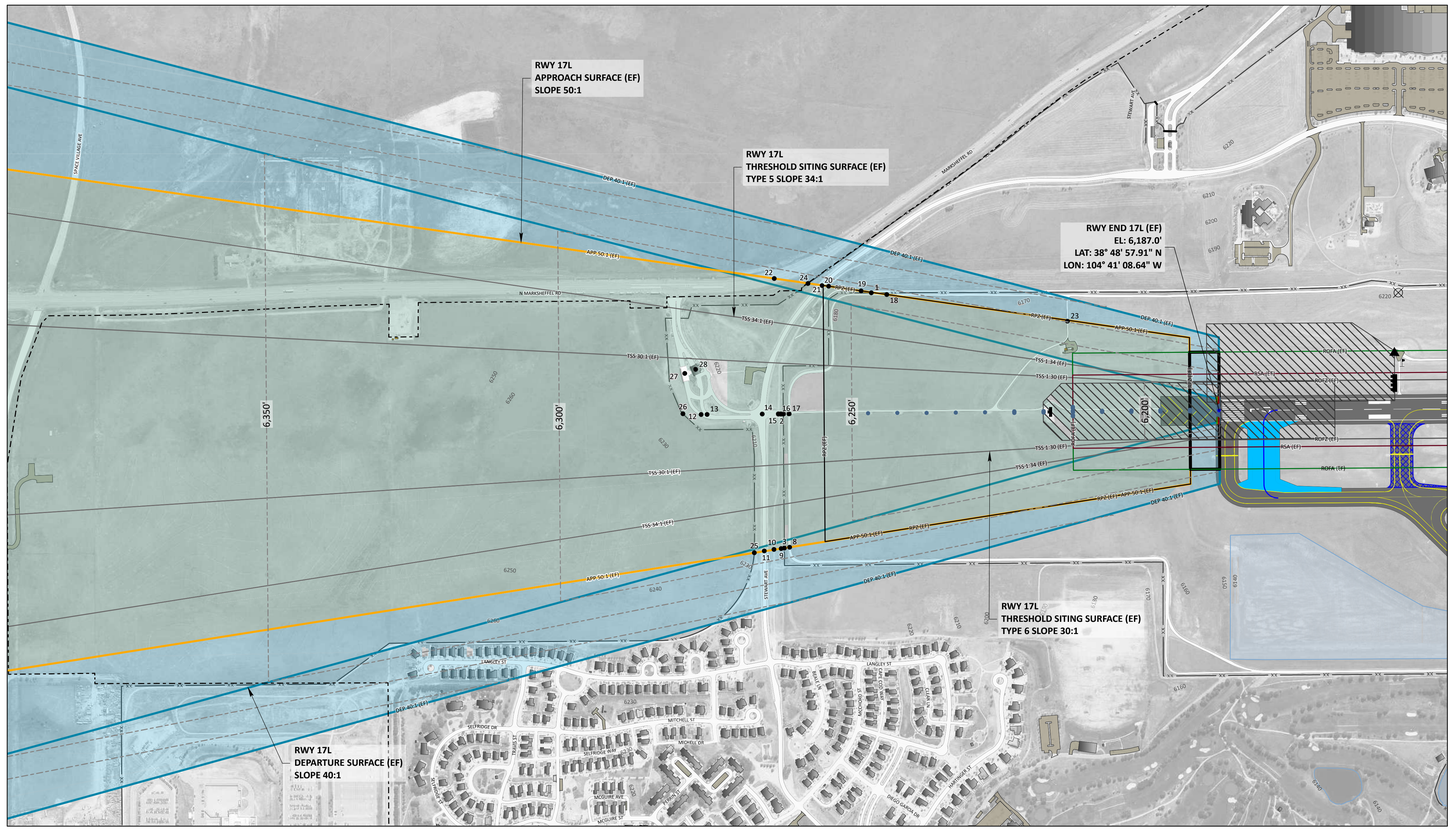
ISSUE RECORD

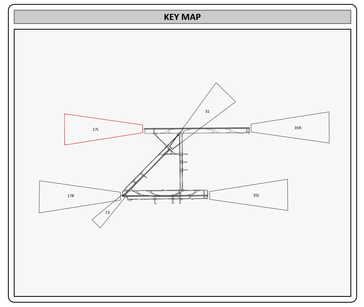
NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

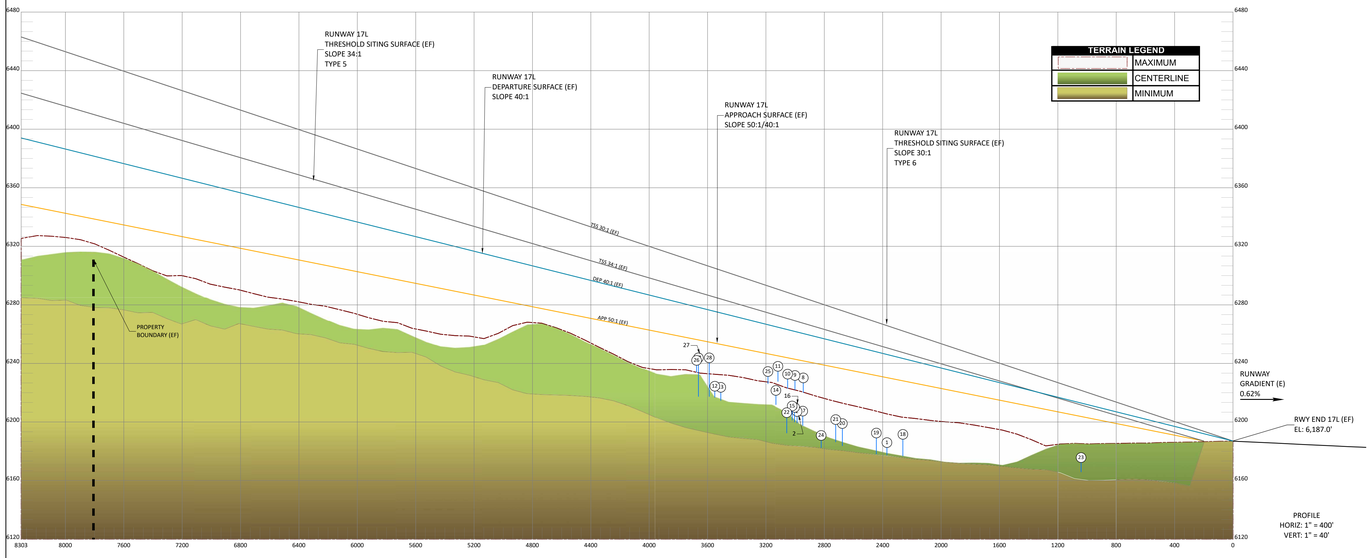
PART 77 FUTURE AIRSPACE OBSTRUCTION TABLES

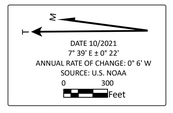
AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: DECEMBER 2022





RUNWAY 17L FUTURE P77 APPROACH AND DEPARTURE SURFACE OBSTRUCTION TABLE							
REF #	OBJECT TYPE	GROUND ELEVATION (MSL)	TOP OF OBJECT ELEVATION (AGL)	TOP OF OBJECT ELEVATION (MSL)	APPROACH SURFACE PENETRATION	DEPARTURE SURFACE PENETRATION	DISPOSITION
1	FENCE	6,177.6'	8.0'	6,185.6'	-44.7'	-103.4'	NONE
2	FENCE	6,199.3'	8.0'	6,207.3'	-35.4'	-54.4'	NONE
3	FENCE	6,221.6'	8.0'	6,229.6'	-13.1'	-50.9'	NONE
8	ACCESS CONTROLLED ROAD	6,220.1'	10.0'	6,230.1'	-11.9'	-50.9'	NONE
9	ACCESS CONTROLLED ROAD	6,221.8'	10.0'	6,231.8'	-11.4'	-48.4'	NONE
10	ACCESS CONTROLLED ROAD	6,222.7'	10.0'	6,232.7'	-11.5'	-46.8'	NONE
11	ACCESS CONTROLLED ROAD	6,228.0'	10.0'	6,238.0'	-7.5'	-40.5'	NONE
12	ACCESS CONTROLLED ROAD	6,214.4'	10.0'	6,224.4'	-29.6'	-51.3'	NONE
13	ACCESS CONTROLLED ROAD	6,213.6'	10.0'	6,223.6'	-29.5'	-51.1'	NONE
14	ACCESS CONTROLLED ROAD	6,211.5'	10.0'	6,221.5'	-24.1'	-43.8'	NONE
15	ACCESS CONTROLLED ROAD	6,200.9'	10.0'	6,210.9'	-32.5'	-51.6'	NONE
16	ACCESS CONTROLLED ROAD	6,199.9'	10.0'	6,209.9'	-33.1'	-52.2'	NONE
17	ACCESS CONTROLLED ROAD	6,197.4'	10.0'	6,207.4'	-34.6'	-53.3'	NONE
18	PUBLIC ROAD	6,176.5'	15.0'	6,191.5'	-36.6'	-99.5'	NONE
19	PUBLIC ROAD	6,177.4'	15.0'	6,192.4'	-39.3'	-96.0'	NONE
20	PUBLIC ROAD	6,183.9'	15.0'	6,198.9'	-37.5'	-86.2'	NONE
21	PUBLIC ROAD	6,186.6'	15.0'	6,201.6'	-35.7'	-82.9'	NONE
22	PUBLIC ROAD	6,191.4'	15.0'	6,206.4'	-37.7'	-73.4'	NONE
23	ACCESS CONTROLLED ROAD	6,165.7'	10.0'	6,175.7'	-28.2'	-133.6'	NONE
24	FENCE	6,182.8'	8.0'	6,190.8'	-48.5'	-92.6'	NONE
25	FENCE	6,226.4'	8.0'	6,234.4'	-12.4'	-43.1'	NONE
26	FENCE	6,234.1'	8.0'	6,242.1'	-14.4'	-36.8'	NONE
27	PETERSON AFB EAST GATE	6,216.7'	27.0'	6,243.8'	-12.4'	-34.7'	NONE
28	BUILDING	6,216.0'	28.0'	6,243.8'	-10.9'	-32.8'	NONE





SOURCES

- THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2021

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. ALL ROAD ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENTS OF 23' FOR RAILWAYS, 17' FOR INTERSTATE HIGHWAYS, 15' FOR OTHER PUBLIC ROADS AND 10' FOR PRIVATE ROADS

LEGEND

LEGEND ITEM	EXISTING	FUTURE
AIRPORT CONTROL POINT		SAME
AIRPORT PAVEMENT		
AIRPORT PAVEMENT MARKINGS		
AIRPORT PROPERTY BOUNDARY		SAME
APPROACH SURFACE (50:1/40:1)	AP 50:1 (E)	AP 50:1 (F)
BUILDING (OFF-AIRPORT)		SAME
DEPARTURE SURFACE (40:1)	DP 40:1 (E)	DP 40:1 (F)
FENCE (8' HEIGHT OR LESS)		SAME
LOCALIZER		SAME
MALSR/ALSF		SAME
NAVAID CRITICAL AREA		SAME
PRECISION OBJECT FREE ZONE (POFZ)		
ROAD		
RUNWAY END LIGHT		SAME
RUNWAY OBJECT FREE AREA (ROFA)	ROFA(E)	ROFA(F)
RUNWAY OBJECT FREE ZONE (ROFZ)	ROFZ(E)	ROFZ(F)
RUNWAY PROTECTION ZONE (RPZ)	RPZ(E)	RPZ(F)
RUNWAY SAFETY AREA (RSA)	RSA(E)	RSA(F)
THRESHOLD SITING SURFACE (TSS)	TSS(E)	TSS(F)
WATER FEATURE		SAME

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: S.C.
CH: T.D.
APP: T.D.

ISSUE RECORD

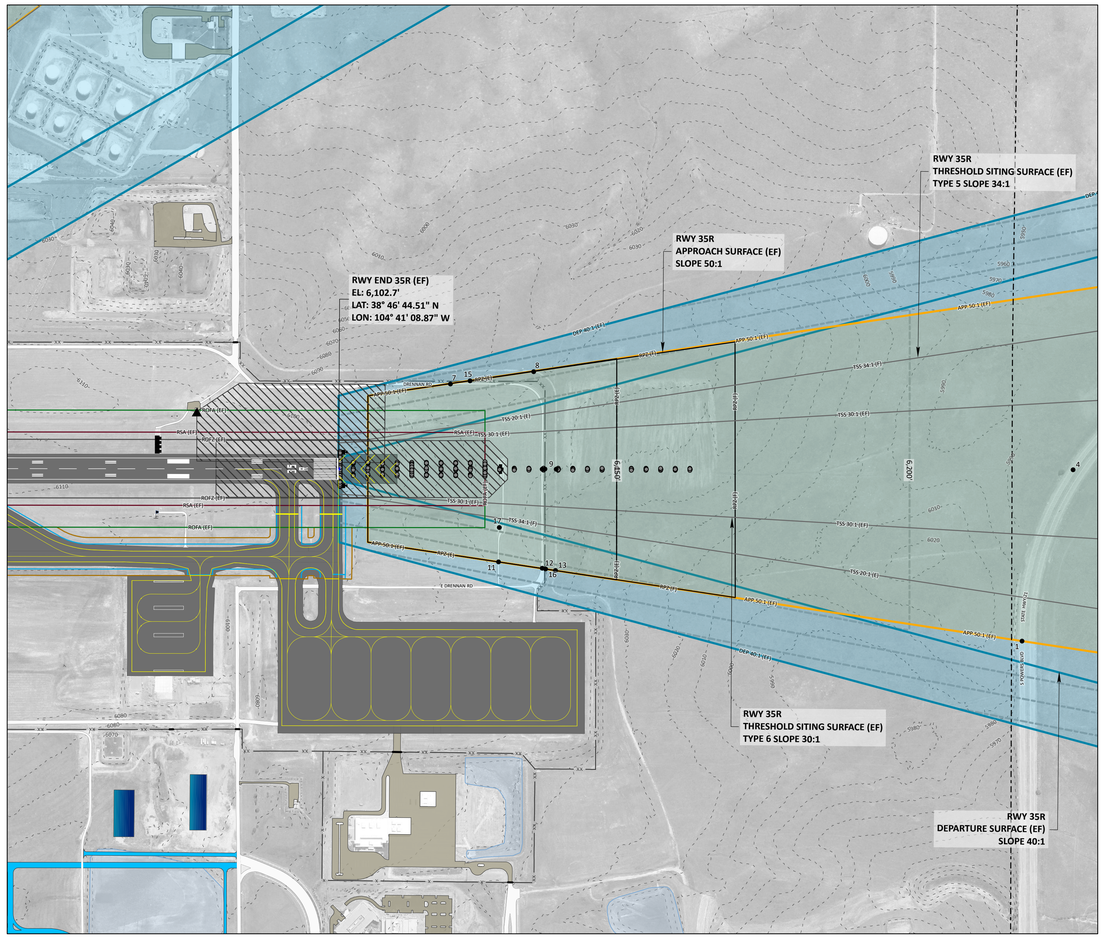
NO.	BY	DATE	DESCRIPTION

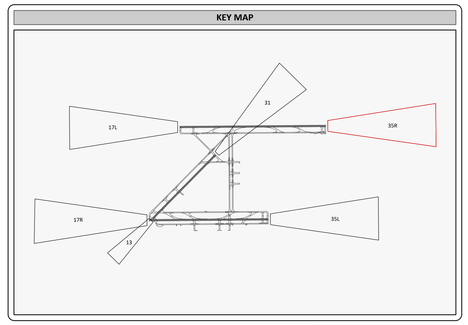
2022 AIRPORT LAYOUT PLAN

INNER PORTION OF THE APPROACH AND DEPARTURE SURFACE DRAWING 17L

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: DECEMBER 2022

SHEET NO. 11 of 18

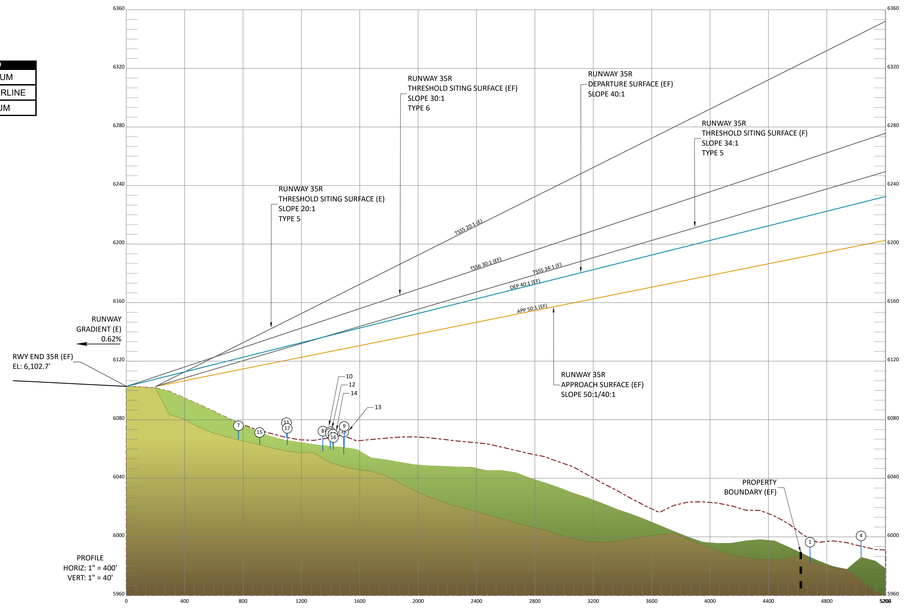


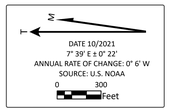


RUNWAY 35R FUTURE APPROACH AND DEPARTURE SURFACE OBSTRUCTION TABLE

REF #	OBJECT TYPE	GROUND ELEVATION (MSL)	TOP OF OBJECT ELEVATION (AGL)	TOP OF OBJECT ELEVATION (MSL)	APPROACH SURFACE PENETRATION	DEPARTURE SURFACE PENETRATION	DISPOSITION
1	PUBLIC ROAD	5,981.3'	15.0'	5,996.3'	-195.6'	-222.9'	NONE
4	PUBLIC ROAD	5,985.6'	15.0'	6,000.6'	-198.3'	-227.3'	NONE
5	PUBLIC ROAD	5,939.5'	15.0'	5,954.5'	-274.6'	-311.2'	NONE
7	ACCESS CONTROLLED ROAD	6,065.8'	10.0'	6,075.8'	-37.6'	-147.7'	NONE
8	PUBLIC ROAD	6,057.2'	15.0'	6,072.2'	-52.8'	-142.2'	NONE
9	PUBLIC ROAD	6,060.4'	15.0'	6,075.4'	-52.8'	-64.2'	NONE
10	ACCESS CONTROLLED ROAD	6,061.8'	10.0'	6,071.8'	-54.5'	-65.4'	NONE
11	ACCESS CONTROLLED ROAD	6,067.9'	10.0'	6,077.9'	-42.5'	-139.6'	NONE
12	ACCESS CONTROLLED ROAD	6,060.6'	10.0'	6,070.6'	-55.7'	-140.5'	NONE
13	PUBLIC ROAD	6,056.6'	15.0'	6,071.6'	-56.7'	-139.0'	NONE
14	FENCE	6,062.4'	8.0'	6,070.4'	-56.3'	-103.4'	NONE
15	FENCE	6,063.5'	8.0'	6,071.5'	-44.9'	-54.4'	NONE
16	FENCE	6,059.8'	8.0'	6,067.8'	-58.9'	-50.9'	NONE
17	BUILDING 105	6,166.0'	12.2'	6,178.2'	-46.4'	-66.9'	NONE

TERRAIN LEGEND	
	MAXIMUM
	CENTERLINE
	MINIMUM





SOURCES
* NOISE CONTOURS DERIVED FROM 2020 LAND USE STUDY COMPILED BY WOOLPERT, INC 2020. CONTOURS BASED ON ANNUAL SERVICE VOLUME

NOTES
1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. FILTERED OBSTRUCTIONS LEFT UNLABELED FOR MAP CLARITY DUE TO PROXIMITY TO MORE CRITICAL LABELED OBSTRUCTIONS

LEGEND		
LEGEND ITEM	EXISTING	FUTURE
AIRPORT CONTROL POINT	•	SAME
AIRPORT PAVEMENT		
AIRPORT PAVEMENT MARKINGS		
AIRPORT PROPERTY BOUNDARY		SAME
APPROACH SURFACE (50:1/40:1)	AP 50:1 (E)	AP 50:1 (F)
BUILDING (OFF-AIRPORT)		SAME
DEPARTURE SURFACE (40:1)	DP 40:1 (E)	DP 40:1 (F)
FENCE (8' HEIGHT OR LESS)	FE	SAME
GATE		SAME
LOCALIZER		SAME
MALSR/ALSF2		SAME
NAVAID CRITICAL AREA		SAME
PRECISION OBJECT FREE ZONE (POFZ)		
ROAD		SAME
RUNWAY END LIGHT		SAME
RUNWAY OBJECT FREE AREA (ROFA)	ROFA(E)	ROFA(F)
RUNWAY OBJECT FREE ZONE (ROFZ)	ROFZ(E)	ROFZ(F)
RUNWAY PROTECTION ZONE (RPZ)	RPZ(E)	TPZ(F)
RUNWAY SAFETY AREA (RSA)	RSA(E)	RSA(F)
THRESHOLD SITING SURFACE (TSS)	TSS(E)	TSS(F)
WATER FEATURE		SAME
WIND CONE		SAME

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: S.C.
CH: T.D.
APP: T.D.

ISSUE RECORD

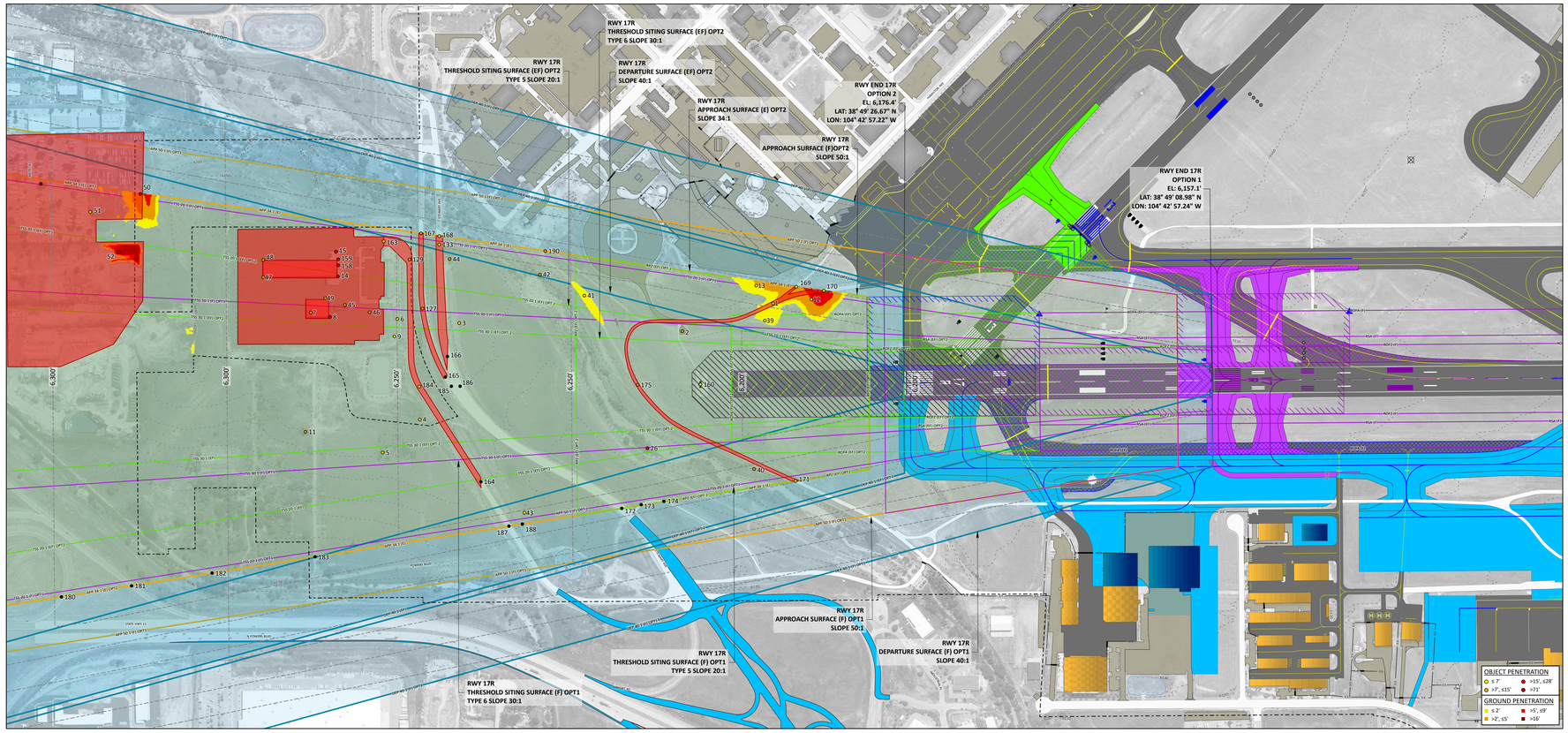
NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

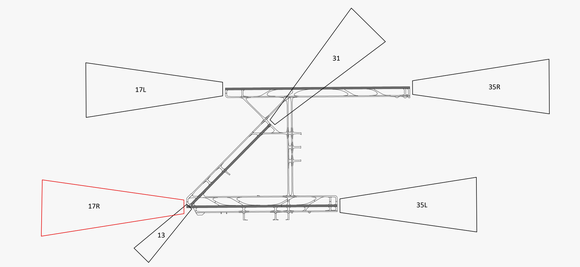
INNER PORTION OF THE APPROACH AND DEPARTURE SURFACE DRAWING 35R

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: DECEMBER 2022

SHEET NO. 12 of 18

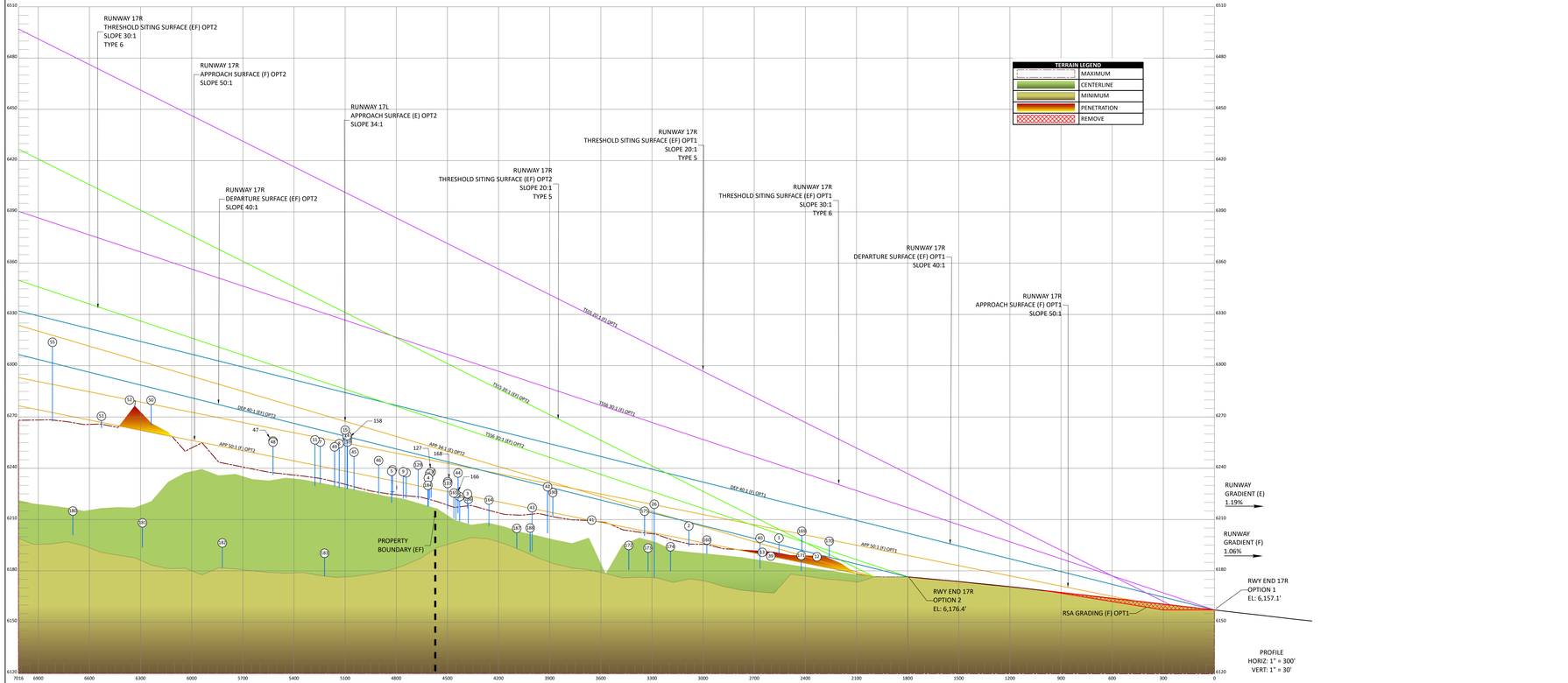


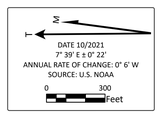
KEY MAP



RUNWAY 17R FUTURE P77 APPROACH AND DEPARTURE SURFACE OBSTRUCTION TABLE

REF #	OBJECT TYPE	GROUND ELEVATIO (MSL)	TOP OF OBJECT ELEVATION (AGL)	TOP OF OBJECT ELEVATION (MSL)	APPROACH SURFACE PENETRATION OPT1	DEPARTURE SURFACE PENETRATION OPT1	APPROACH SURFACE PENETRATION OPT2	DEPARTURE SURFACE PENETRATION OPT2	DISPOSITION
1	ACCESS CONTROLLED ROAD	6,189.1'	10.0'	6,199.1'	-4.9'	-21.6'	1.1'	-59.3'	LOWER
2	BUILDING	6,194.3'	12.0'	6,206.2'	-8.3'	-27.7'	8.2'	-2.4'	MARK/LIGHT
3	FENCE	6,216.6'	8.4'	6,225.0'	-15.4'	-41.1'	1.1'	-16.0'	MARK/LIGHT
4	POLE	6,217.8'	16.5'	6,234.3'	-10.9'	-37.9'	5.7'	-12.5'	MARK/LIGHT
5	TREE	6,220.2'	18.0'	6,238.2'	-11.2'	-39.3'	5.3'	-14.0'	REMOVE
6	FENCE	6,222.7'	14.7'	6,237.4'	-10.2'	-37.9'	6.3'	-12.6'	MARK/LIGHT
7	BUILDING	6,231.1'	24.2'	6,255.3'	-	-	14.2'	-	MARK/LIGHT
8	BUILDING	6,228.7'	25.7'	6,254.4'	-1.1'	-30.6'	15.5'	-5.3'	MARK/LIGHT
9	TREE	6,222.6'	15.4'	6,238.0'	-10.0'	-37.7'	6.5'	-12.4'	REMOVE
11	TREE	6,230.0'	26.6'	6,256.6'	-	-	14.7'	-	REMOVE
12	GROUND	6,188.2'	0.0'	6,188.2'	-11.4'	-27.0'	5.2'	-91.6'	LOWER
13	GROUND	6,190.8'	0.0'	6,190.8'	-15.1'	-32.3'	1.4'	-96.2'	LOWER
14	BUILDING	6,228.0'	31.0'	6,259.1'	4.5'	-24.8'	21.1'	0.5'	MARK/LIGHT
15	POLE	6,228.8'	33.5'	6,262.3'	7.6'	-21.8'	24.1'	3.5'	MARK/LIGHT
26	TREE	6,176.0'	42.9'	6,219.0'	0.2'	-20.2'	16.8'	5.1'	REMOVE
39	GROUND	6,188.6'	0.0'	6,188.6'	-16.4'	-33.4'	0.1'	-33.8'	LOWER
40	TREE	6,181.8'	17.3'	6,199.0'	-7.3'	-24.6'	9.2'	-60.1'	REMOVE
41	GROUND	6,209.7'	0.0'	6,209.7'	-16.2'	-38.4'	0.3'	-13.1'	LOWER
42	TREE	6,269.7'	25.5'	6,229.2'	-1.9'	-25.3'	14.7'	-2.3'	REMOVE
43	TREE	6,193.4'	25.5'	6,218.9'	-18.2'	-40.1'	0.4'	-28.5'	REMOVE
44	TREE	6,213.9'	23.4'	6,237.2'	-4.3'	-30.4'	12.3'	-5.1'	REMOVE
45	BUILDING	6,227.4'	22.0'	6,249.4'	-4.3'	-33.5'	12.2'	-8.1'	MARK/LIGHT
46	PARKING LOT	6,229.5'	15.0'	6,244.5'	-6.4'	-34.8'	10.1'	-9.5'	MARK/LIGHT
47	BUILDING	6,236.6'	19.3'	6,255.9'	-	-	9.3'	-	MARK/LIGHT
48	BUILDING	6,236.3'	18.9'	6,255.3'	-	-	8.6'	-	MARK/LIGHT
49	BUILDING	6,229.6'	22.9'	6,252.5'	-3.4'	-33.2'	13.1'	-7.8'	MARK/LIGHT
50	PARKING LOT	6,264.8'	15.0'	6,279.8'	-	-	18.9'	-	MARK/LIGHT
51	FENCE	6,264.0'	6.5'	6,270.4'	-	-	3.8'	-	MARK/LIGHT
52	GROUND	6,279.9'	0.0'	6,279.9'	-	-	16.5'	-	LOWER
55	TREE	6,267.6'	46.1'	6,313.7'	-	-	41.4'	-	REMOVE
127	PRIMARY ROAD	6,222.9'	15.0'	6,237.9'	-6.8'	-33.7'	9.7'	-6.4'	MARK/LIGHT
129	PRIMARY ROAD	6,226.8'	15.0'	6,241.8'	-4.3'	-31.6'	12.2'	-6.3'	MARK/LIGHT
133	PRIMARY ROAD	6,216.1'	15.0'	6,231.1'	-11.6'	-38.0'	4.9'	-23.1'	MARK/LIGHT
158	BUILDING	6,228.2'	29.5'	6,257.8'	3.3'	-26.0'	19.8'	-0.7'	MARK/LIGHT
159	BUILDING	6,228.5'	26.8'	6,255.3'	0.9'	-28.5'	17.4'	-3.1'	MARK/LIGHT
160	TOP OF LOC	6,190.1'	7.9'	6,198.0'	-14.5'	-33.4'	2.0'	-8.0'	MARK/LIGHT
163	PRIMARY ROAD	6,224.1'	15.0'	6,239.1'	-20.4'	-48.5'	6.5'	-52.7'	MARK/LIGHT
180	PRIMARY ROAD	6,200.0'	15.0'	6,215.0'	-	-	-55.3'	-	MARK/LIGHT
181	PRIMARY ROAD	6,193.0'	15.0'	6,208.0'	-	-	-54.3'	-	MARK/LIGHT
182	PRIMARY ROAD	6,181.3'	15.0'	6,196.3'	-	-	-56.7'	-	MARK/LIGHT
183	PRIMARY ROAD	6,175.3'	15.0'	6,190.3'	-	-	-50.7'	-	MARK/LIGHT
187	PRIMARY ROAD	6,189.8'	15.0'	6,204.8'	-30.1'	-54.5'	-13.7'	-69.9'	MARK/LIGHT
188	PRIMARY ROAD	6,190.0'	15.0'	6,205.0'	-28.3'	-52.3'	-11.8'	-70.7'	MARK/LIGHT
172	PRIMARY ROAD	6,179.8'	15.0'	6,194.8'	-16.9'	-48.1'	-10.3'	-89.0'	MARK/LIGHT
173	PRIMARY ROAD	6,178.3'	15.0'	6,193.3'	-26.2'	-46.8'	-9.8'	-90.8'	MARK/LIGHT
174	PRIMARY ROAD	6,179.1'	15.0'	6,194.1'	-22.8'	-42.7'	-6.3'	-92.5'	MARK/LIGHT
175	ACCESS CONTROLLED ROAD	6,199.9'	10.0'	6,209.9'	-4.9'	-25.6'	11.6'	-10.3'	MARK/LIGHT
185	PRIMARY ROAD	6,223.4'	15.0'	6,223.4'	-18.0'	-44.1'	-1.5'	-18.8'	MARK/LIGHT
186	PRIMARY ROAD	6,213.8'	15.0'	6,213.8'	-18.6'	-44.4'	-2.0'	-19.1'	MARK/LIGHT
164	PRIMARY ROAD	6,206.4'	15.0'	6,221.4'	-3388.5'	-3413.7'	-0.2'	-16.6'	MARK/LIGHT
165	PRIMARY ROAD	6,210.5'	15.0'	6,225.5'	-6242.1'	-6268.4'	0.5'	-17.5'	MARK/LIGHT
166	PRIMARY ROAD	6,210.2'	15.0'	6,225.2'	-6241.9'	-6268.0'	0.5'	-17.5'	MARK/LIGHT
167	PRIMARY ROAD	6,222.3'	15.0'	6,237.3'	-8.0'	-35.0'	8.9'	-32.0'	MARK/LIGHT
168	PRIMARY ROAD	6,217.9'	15.0'	6,232.9'	-10.9'	-37.0'	6.5'	-37.8'	MARK/LIGHT
169	PRIMARY ROAD	6,188.9'	10.0'	6,198.9'	1.8'	-14.2'	3.1'	-100.2'	MARK/LIGHT
170	PRIMARY ROAD	6,187.9'	10.0'	6,197.9'	-0.8'	-16.0'	6.3'	-103.3'	MARK/LIGHT
190	PRIMARY ROAD	6,210.8'	15.0'	6,225.8'	-4.6'	-27.9'	11.3'	-53.3'	MARK/LIGHT
171	ACCESS CONTROLLED ROAD	6,178.9'	10.0'	6,189.9'	-12.6'	-28.7'	4.8'	-108.3'	MARK/LIGHT
184	PRIMARY ROAD	6,230.0'	15.0'	6,245.0'	-15.1'	-42.1'	1.4'	-56.8'	MARK/LIGHT





SOURCES

* THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2021

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. ALL ROAD ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENTS OF 23' FOR RAILWAYS, 17' FOR INTERSTATE HIGHWAYS, 15' FOR OTHER PUBLIC ROADS AND 10' FOR PRIVATE ROADS
5. FILTERED OBSTRUCTIONS LEFT UNLABELED FOR MAP CLARITY DUE TO PROXIMITY TO MORE CRITICAL LABELED OBSTRUCTIONS
6. DRAWING DEPICTS ALTERNATIVE OPTIONS TO RESOLVE HOT SPOT 1, OPTION 1 BEING THE RELOCATION OF RUNWAY END 17R, OPTION 2 BEING THE RELOCATION OF RUNWAY END 13
7. MOST CRITICAL FUTURE DEVELOPMENT OPTION IS SHOWN TO REFLECT WORST CASE SCENARIO FOR FUTURE AIRSPACE

LEGEND

LEGEND ITEM	EXISTING	FUTURE
AIRPORT PAVEMENT		
AIRPORT PAVEMENT MARKINGS		
AIRPORT PROPERTY BOUNDARY		SAME
APPROACH SURFACE (34:1)	APP 34:1 (E)	APP 34:1 (F)
APPROACH SURFACE (50:1/40:1)	APP 50:1/40:1 (E)	APP 50:1/40:1 (F)
BUILDING (ON-AIRPORT)		
BUILDING PENETRATION	N/A	
DEPARTURE SURFACE (40:1)	DEP 40:1 (E)	DEP 40:1 (F)
FENCE (6' HEIGHT OR LESS)		SAME
FENCE (8' HEIGHT OR LESS)		SAME
GATE		SAME
GLIDE SLOPE ANTENNA		
LOCALIZER		
NAVAID CRITICAL AREA		
PAPI		SAME
PARKING AREA		SAME
PAVEMENT PENETRATION	N/A	
PRECISION OBJECT FREE ZONE (POFZ)		
REIL		
ROAD		
RUNWAY END LIGHT		SAME
RUNWAY OBJECT FREE AREA (ROFA)	ROFA(E)	ROFA(F)
RUNWAY OBJECT FREE ZONE (ROFZ)	ROFZ(E)	ROFZ(F)
RUNWAY PROTECTION ZONE (RPZ)	RPZ(E)	RPZ(F)
RUNWAY SAFETY AREA (RSA)	RSA(E)	RSA(F)
THRESHOLD SITING SURFACE (TSS)	TSS(E)	TSS(F)
TO BE REMOVED	N/A	

LEGEND FOR OPTIONS TO RESOLVE HOT SPOT 1

LEGEND ITEM	FUTURE
AIRSIDE PAVEMENT - OPTION 1	
AIRSIDE PAVEMENT - OPTION 2	
NAVAID CRITICAL AREA - OPTION 1	
PAVEMENT TO BE REMOVED - OPTION 1	
PAVEMENT TO BE REMOVED - OPTION 2	
RUNWAY PROTECTION STANDARD/THRESHOLD SITING SURFACE - OPTION 1	OPT1

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: K.D.
CH: T.D.
APP: T.D.

ISSUE RECORD

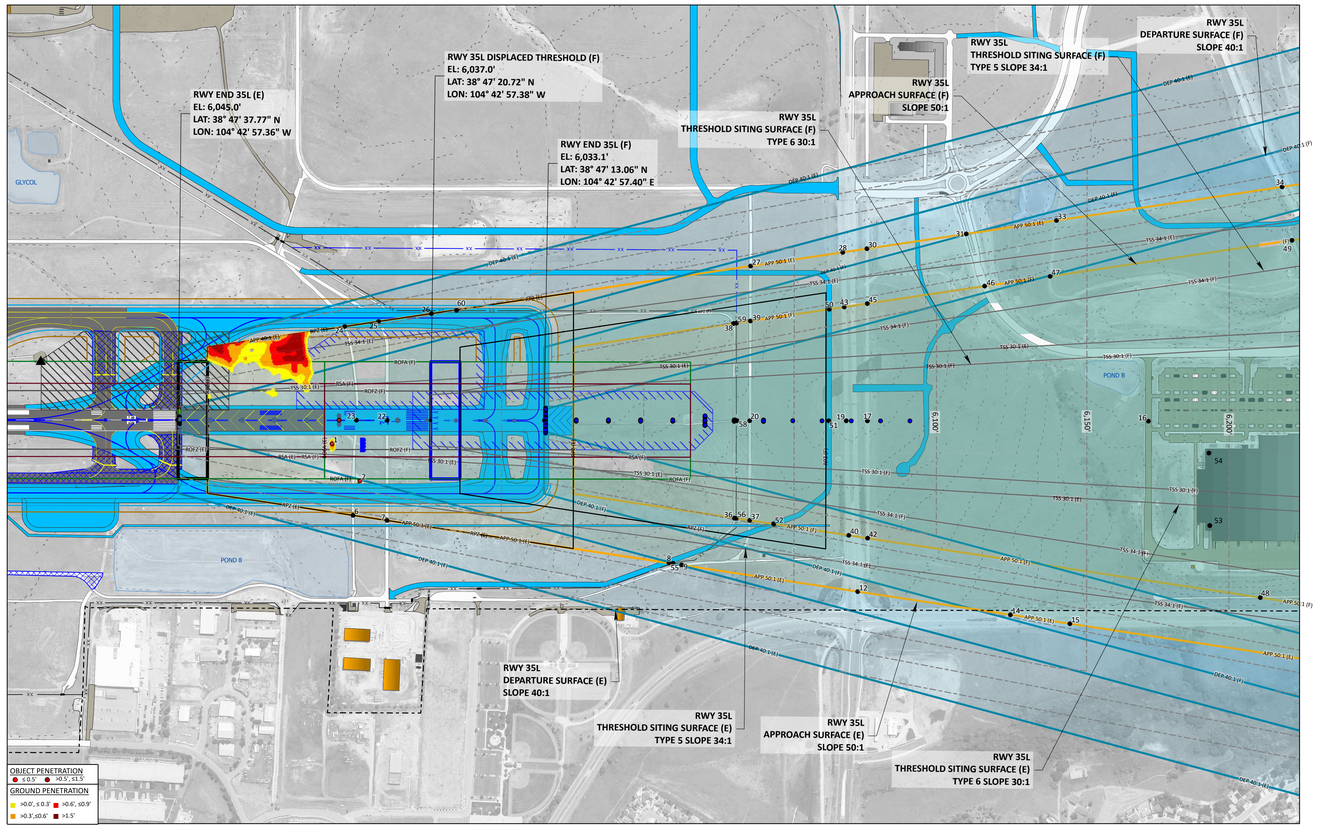
NO.	BY	DATE	DESCRIPTION

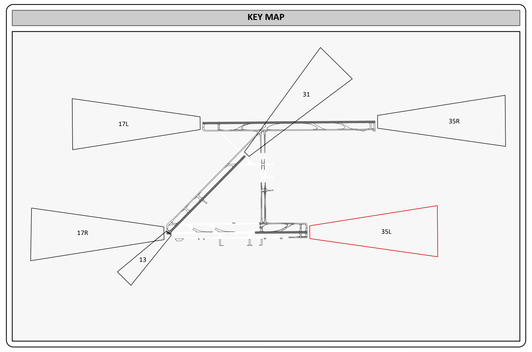
2022 AIRPORT LAYOUT PLAN

INNER PORTION OF THE APPROACH AND DEPARTURE SURFACE DRAWING 17R

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: DECEMBER 2022

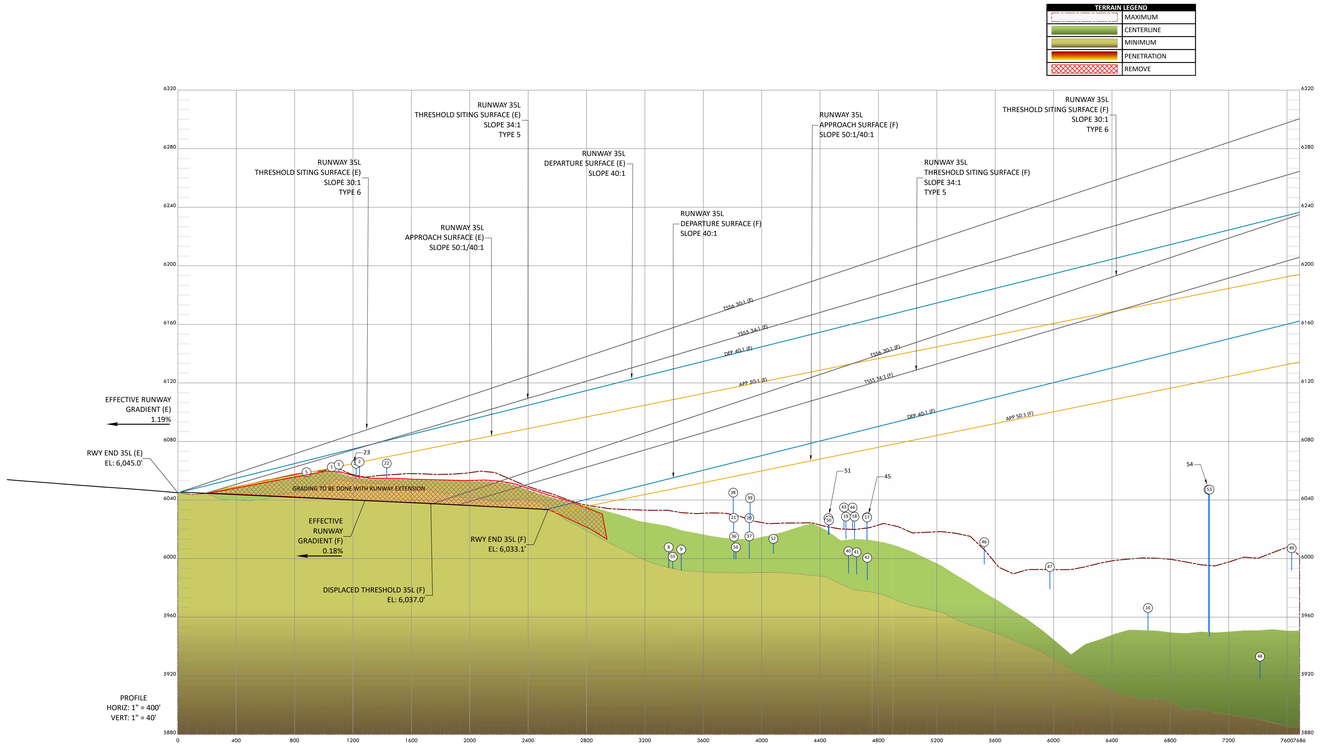
SHEET NO. 13 of 18

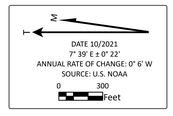




RUNWAY 35L EXISTING P77 APPROACH AND DEPARTURE SURFACE OBSTRUCTION TABLE						
REF #	OBJECT TYPE	GROUND ELEVATIO (MSL)	TOP OF OBJECT ELEVATION (AGL)	TOP OF OBJECT ELEVATION (MSL)	APPROACH SURFACE PENETRATION	DEPARTURE SURFACE PENETRATION	DISPOSITION
1	GROUND	6,062.5'	0.0'	6,062.5'	0.5'	-8.6'	LOWERED
2	BUILDING	6,055.4'	10.6'	6,066.0'	0.2'	-13.8'	MARK/LIGHT
3	TOP OF MALSR	6,058.5'	5.6'	6,064.1'	1.2'	-8.1'	FIXED BY FUNCTION
6	ACCESS CONTROLLED ROAD	6,051.7'	10.0'	6,061.7'	-3.1'	-98.1'	NONE
7	ACCESS CONTROLLED ROAD	6,051.7'	10.0'	6,061.7'	-7.8'	-94.8'	NONE
8	PUBLIC ROAD	5,992.8'	15.0'	6,007.8'	-100.2'	-124.1'	NONE
9	PUBLIC ROAD	5,991.2'	15.0'	6,006.2'	-103.6'	-124.5'	NONE
12	PUBLIC ROAD	5,978.3'	15.0'	5,993.3'	-140.5'	-167.6'	NONE
14	PUBLIC ROAD	5,946.2'	15.0'	5,961.2'	-193.5'	-225.7'	NONE
15	PUBLIC ROAD	5,930.1'	15.0'	5,945.1'	-217.7'	-252.0'	NONE
16	PUBLIC ROAD	5,951.3'	15.0'	5,966.3'	-207.3'	-244.2'	NONE
17	PUBLIC ROAD	6,013.1'	15.0'	6,028.1'	-107.1'	-134.4'	NONE
19	PUBLIC ROAD	6,013.7'	15.0'	6,028.7'	-103.5'	-130.2'	NONE
20	PUBLIC ROAD	6,012.6'	15.0'	6,027.6'	-91.4'	-114.7'	NONE
21	PUBLIC ROAD	6,012.8'	15.0'	6,027.8'	-89.1'	-111.9'	NONE
22	ACCESS CONTROLLED ROAD	6,055.0'	10.0'	6,065.0'	-4.5'	-15.4'	NONE
23	ACCESS CONTROLLED ROAD	6,054.8'	10.0'	6,064.8'	-0.5'	-10.4'	NONE
24	ACCESS CONTROLLED ROAD	6,056.8'	10.0'	6,066.8'	3.1'	-94.7'	NONE
25	ACCESS CONTROLLED ROAD	6,056.3'	10.0'	6,066.3'	-2.1'	-92.1'	NONE
26	ACCESS CONTROLLED ROAD	6,056.8'	10.0'	6,066.8'	-8.7'	-86.7'	NONE
27	PUBLIC ROAD	6,028.1'	15.0'	6,038.1'	-81.0'	-104.4'	NONE
28	PUBLIC ROAD	6,020.0'	15.0'	6,035.0'	-96.8'	-123.2'	NONE
30	PUBLIC ROAD	6,014.9'	15.0'	6,029.9'	-105.1'	-132.4'	NONE
31	PUBLIC ROAD	6,015.2'	15.0'	6,030.2'	-118.3'	-149.1'	NONE
33	PUBLIC ROAD	5,991.8'	15.0'	6,006.8'	-154.2'	-187.9'	NONE
34	PUBLIC ROAD	5,991.0'	15.0'	6,006.0'	-185.7'	-227.2'	NONE
51	ACCESS CONTROLLED ROAD	6,017.6'	10.0'	6,027.6'	-102.2'	-128.3'	NONE
53	BUILDING	5,946.6'	100.5'	6,047.1'	-134.8'	-173.9'	NONE
54	BUILDING	5,946.6'	100.5'	6,047.1'	-134.6'	-173.7'	NONE
55	FENCE	5,993.2'	8.0'	6,001.2'	-107.5'	-130.5'	NONE
58	FENCE	6,013.3'	8.0'	6,021.3'	-96.0'	-118.9'	NONE
60	FENCE	6,057.9'	8.0'	6,065.9'	-13.0'	-84.0'	NONE

RUNWAY 35L FUTURE P77 APPROACH AND DEPARTURE SURFACE OBSTRUCTION TABLE						
REF #	OBJECT TYPE	GROUND ELEVATIO (MSL)	TOP OF OBJECT ELEVATION (AGL)	TOP OF OBJECT ELEVATION (MSL)	APPROACH SURFACE PENETRATION	DEPARTURE SURFACE PENETRATION	DISPOSITION
16	PUBLIC ROAD	5,951.3'	15.0'	5,966.3'	-145.4'	-169.9'	NONE
17	PUBLIC ROAD	6,013.1'	15.0'	6,028.1'	-45.1'	-60.1'	NONE
19	PUBLIC ROAD	6,013.7'	15.0'	6,028.7'	-41.7'	-55.8'	NONE
20	PUBLIC ROAD	6,012.6'	15.0'	6,027.6'	-29.6'	-40.4'	NONE
21	PUBLIC ROAD	6,012.8'	15.0'	6,027.8'	-27.2'	-37.5'	NONE
36	PUBLIC ROAD	5,999.9'	15.0'	6,014.9'	-40.2'	-131.6'	NONE
37	PUBLIC ROAD	6,000.2'	15.0'	6,015.2'	-42.0'	-129.8'	NONE
38	PUBLIC ROAD	6,030.1'	15.0'	6,045.1'	-9.9'	-102.5'	NONE
39	PUBLIC ROAD	6,026.3'	15.0'	6,041.3'	-16.0'	-104.7'	NONE
40	PUBLIC ROAD	5,990.0'	15.0'	6,005.0'	-65.7'	-130.3'	NONE
42	PUBLIC ROAD	5,985.5'	15.0'	6,000.5'	-72.8'	-133.2'	NONE
43	PUBLIC ROAD	6,019.9'	15.0'	6,034.9'	-35.2'	-102.3'	NONE
45	PUBLIC ROAD	6,013.2'	15.0'	6,028.2'	-45.0'	-106.9'	NONE
46	PUBLIC ROAD	5,996.3'	15.0'	6,011.3'	-78.0'	-112.9'	NONE
47	PUBLIC ROAD	5,979.3'	15.0'	5,994.3'	-104.0'	-125.9'	NONE
48	PUBLIC ROAD	5,918.0'	15.0'	5,933.0'	-194.0'	-222.3'	NONE
49	PUBLIC ROAD	5,992.0'	15.0'	6,007.0'	-124.2'	-153.6'	NONE
50	ACCESS CONTROLLED ROAD	6,016.0'	10.0'	6,026.0'	-42.0'	-112.6'	NONE
51	ACCESS CONTROLLED ROAD	6,017.6'	10.0'	6,027.6'	-40.4'	-54.0'	NONE
52	ACCESS CONTROLLED ROAD	6,003.5'	10.0'	6,013.5'	-47.0'	-129.1'	NONE
53	BUILDING	5,946.6'	100.5'	6,047.1'	-73.0'	-99.6'	NONE
54	BUILDING	5,946.6'	100.5'	6,047.1'	-72.9'	-99.4'	NONE
56	FENCE	5,999.6'	8.0'	6,007.6'	-47.7'	-138.5'	NONE
58	FENCE	6,013.3'	8.0'	6,021.3'	-34.2'	-44.6'	NONE
59	FENCE	6,029.8'	8.0'	6,037.8'	-17.6'	-109.5'	NONE


TERRAIN LEGEND
MAXIMUM
CENTERLINE
MINIMUM
PENETRATION
REMOVE
RUNWAY 35L THRESHOLD SITING SURFACE (E) SLOPE 34:1 TYPE 5
RUNWAY 35L THRESHOLD SITING SURFACE (E) SLOPE 30:1 TYPE 6
RUNWAY 35L DEPARTURE SURFACE (E) SLOPE 40:1
RUNWAY 35L APPROACH SURFACE (E) SLOPE 50:1/40:1
RUNWAY 35L DEPARTURE SURFACE (F) SLOPE 40:1
RUNWAY 35L APPROACH SURFACE (F) SLOPE 50:1/40:1
RUNWAY 35L THRESHOLD SITING SURFACE (F) SLOPE 34:1 TYPE 5
RUNWAY 35L THRESHOLD SITING SURFACE (F) SLOPE 30:1 TYPE 6
EFFECTIVE RUNWAY GRADIENT (E) 1.19%
RWY END 35L (E) EL: 6,045.0'
GRADING TO BE DONE WITH RUNWAY EXTENSION
EFFECTIVE RUNWAY GRADIENT (F) 0.18%
DISPLACED THRESHOLD 35L (F) EL: 6,037.0'
RWY END 35L (F) EL: 6,033.1'
PROFILE HORIZ: 1" = 400' VERT: 1" = 40'



SOURCES

* NOISE CONTOURS DERIVED FROM 2020 LAND USE STUDY COMPILED BY WOOLPERT, INC 2020. CONTOURS BASED ON ANNUAL SERVICE VOLUME

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. ALL ROAD ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENTS OF 23' FOR RAILWAYS, 17' FOR INTERSTATE HIGHWAYS, 15' FOR OTHER PUBLIC ROADS AND 10' FOR PRIVATE ROADS
5. FILTERED OBSTRUCTIONS LEFT UNLABELED FOR MAP CLARITY DUE TO PROXIMITY TO MORE CRITICAL LABELED OBSTRUCTIONS

LEGEND

LEGEND ITEM	EXISTING	FUTURE
AIRPORT CONTROL POINT	•	•
AIRPORT PAVEMENT		
AIRPORT PAVEMENT MARKINGS		
AIRPORT PROPERTY BOUNDARY		SAME
APPROACH SURFACE (50:1/40:1)	AP-50:1 (E)	AP-50:1 (F)
DEPARTURE SURFACE (40:1)	DP-40:1 (E)	DP-40:1 (F)
FENCE (8' HEIGHT OR LESS)	xx	SAME
GATE		SAME
GLIDE SLOPE ANTENNA	▲	▲
LOCALIZER		SAME
MALSR/ALSF-2	•	SAME
NAVAID CRITICAL AREA		
OFF-AIRPORT BUILDING		SAME
PAPI		
PRECISION OBJECT FREE ZONE (POFZ)		
ROAD		SAME
RUNWAY END LIGHT	•	SAME
RUNWAY OBJECT FREE AREA (ROFA)	ROFA(E)	ROFA(F)
RUNWAY OBJECT FREE ZONE (ROFZ)	ROFZ(E)	ROFZ(F)
RUNWAY PROTECTION ZONE (RPZ)	RPZ(E)	RPZ(F)
RUNWAY SAFETY AREA (RSA)	RSA(E)	RSA(F)
THRESHOLD SITING SURFACE (TSS)	TSS(E)	TSS(F)
TO BE REMOVED	N/A	
WATER FEATURE		SAME
WIND CONE		SAME

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: K.D.
CH: T.D.
APP: T.D.

ISSUE RECORD

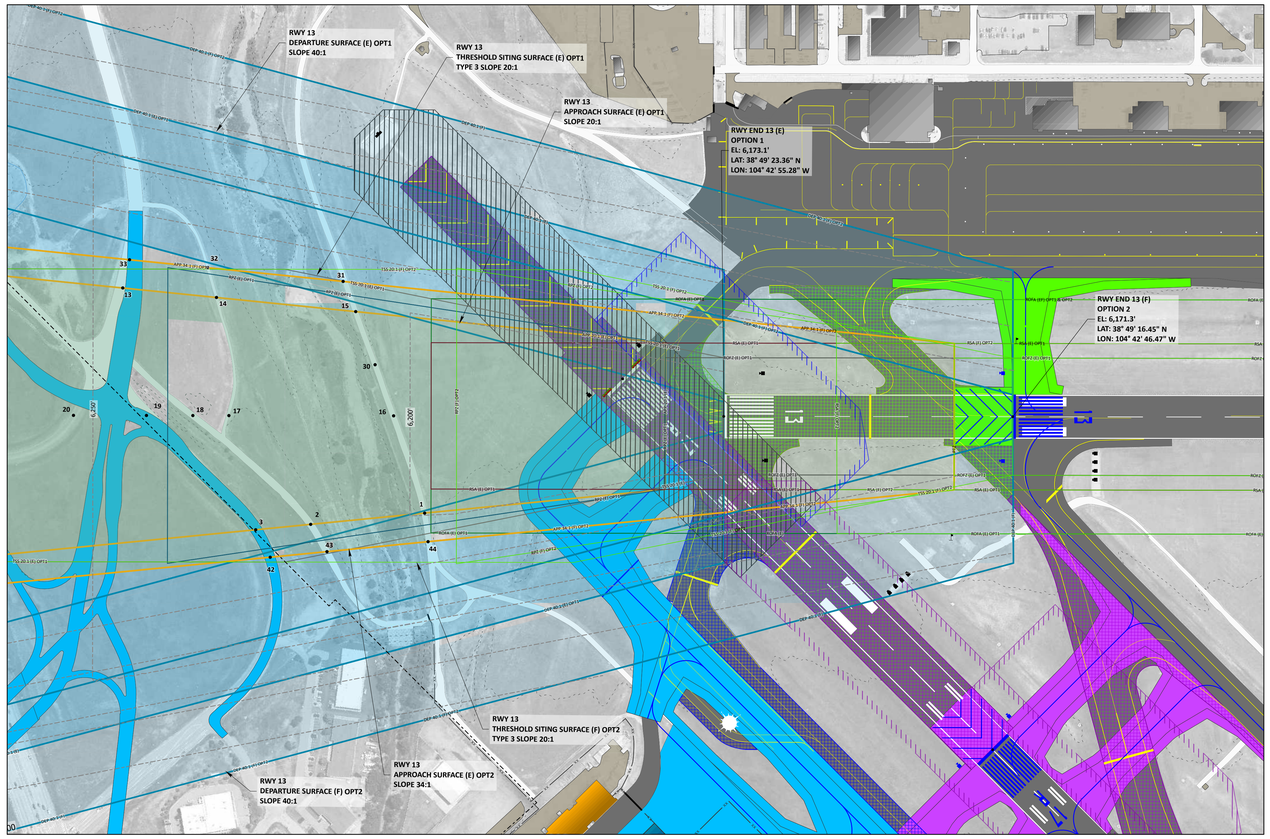
NO.	BY	DATE	DESCRIPTION

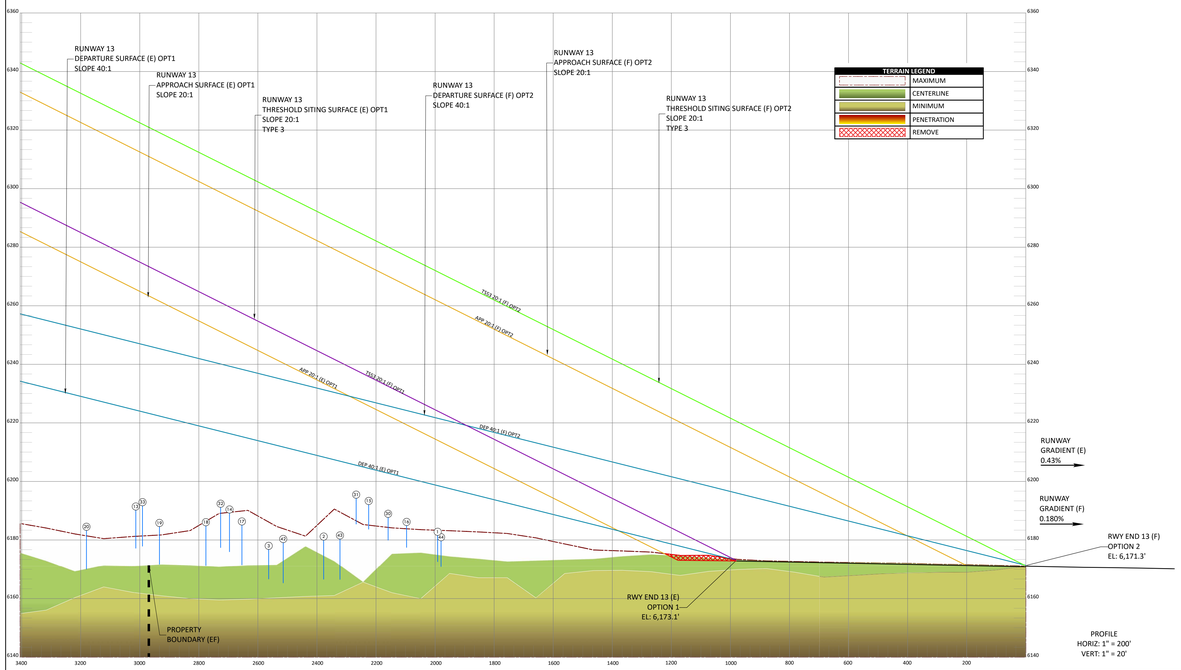
2022 AIRPORT LAYOUT PLAN

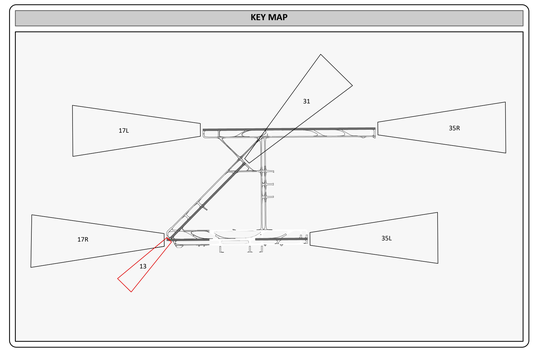
INNER PORTION OF THE APPROACH AND DEPARTURE SURFACE DRAWING 35L

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: DECEMBER 2022

SHEET NO. 14 of 18

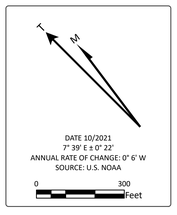






RUNWAY 13 FUTURE P77 APPROACH AND DEPARTURE SURFACE OBSTRUCTION TABLE

REF #	OBJECT TYPE	TOP OF OBJECT ELEVATION (AGL)	TOP OF OBJECT ELEVATION (MSL)	APPROACH SURFACE PENETRATION (EF)	DISPOSTION
1	CONTROLLED ACCESS ROAD	10'	6182.8'	-79.2'	NONE
2	PUBLIC ROAD	15'	6181.2'	-100.3'	NONE
3	PUBLIC ROAD	15'	6178.0'	-112.8'	NONE
13	PUBLIC ROAD	15'	6191.4'	-122.2'	NONE
14	PUBLIC ROAD	15'	6190.4'	-107.2'	NONE
15	CONTROLLED ACCESS ROAD	10'	6193.3'	-80.5'	NONE
16	CONTROLLED ACCESS ROAD	10'	6186.2'	-81.1'	NONE
17	PUBLIC ROAD	15'	6186.3'	-109.1'	NONE
18	PUBLIC ROAD	15'	6186.1'	-115.5'	NONE
19	PUBLIC ROAD	15'	6185.8'	-123.7'	NONE
20	PUBLIC ROAD	15'	6184.5'	-137.5'	NONE
30	CONTROLLED ACCESS ROAD	10'	6188.9'	-81.5'	NONE
31	CONTROLLED ACCESS ROAD	10'	6195.5'	-80.5'	NONE
32	PUBLIC ROAD	15'	6192.4'	-106.9'	NONE
33	PUBLIC ROAD	15'	6192.9'	-120.7'	NONE
42	PUBLIC ROAD	15'	6180.3'	-107.8'	NONE
43	PUBLIC ROAD	15'	6181.6'	-96.9'	NONE
44	CONTROLLED ACCESS ROAD	10'	6181.0'	-80.4'	NONE



SOURCES

- THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2021

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. ALL ROAD ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENTS OF 23' FOR RAILWAYS, 17' FOR INTERSTATE HIGHWAYS, 15' FOR OTHER PUBLIC ROADS AND 10' FOR PRIVATE ROADS
5. FILTERED OBSTRUCTIONS LEFT UNLABELED FOR MAP CLARITY DUE TO PROXIMITY TO MORE CRITICAL LABELED OBSTRUCTIONS
6. DRAWING DEPICTS ALTERNATIVE OPTIONS TO RESOLVE HOT SPOT 1, OPTION 1 BEING THE RELOCATION OF RUNWAY END 17R, OPTION 2 BEING THE RELOCATION OF RUNWAY END 13

LEGEND

LEGEND ITEM	EXISTING	FUTURE
AIRPORT PAVEMENT		
AIRPORT PAVEMENT MARKINGS		
APPROACH SURFACE (20:1)	APP 20:1 (E)	APP 20:1 (F)
BUILDING (OFF-AIRPORT)		SAME
BUILDING (ON-AIRPORT)		SAME
DEPARTURE SURFACE (40:1)	DEP 40:1 (E)	DEP 40:1 (F)
FENCE (6' HEIGHT OR LESS)	x	SAME
FENCE (8' HEIGHT OR LESS)	x x	SAME
GATE		SAME
LOCALIZER		SAME
NAVAID CRITICAL AREA		
PAPI		SAME
PARKING AREA		SAME
REIL		
ROAD		
RUNWAY END LIGHT		SAME
RUNWAY OBJECT FREE AREA (ROFA)	ROFA(E)	ROFA(F)
RUNWAY OBJECT FREE ZONE (ROFZ)	ROFZ(E)	ROFZ(F)
RUNWAY PROTECTION ZONE (RPZ)	RPZ(E)	RPZ(F)
RUNWAY SAFETY AREA (RSA)	RSA(E)	RSA(F)
THRESHOLD SITING SURFACE (TSS)	TSS(E)	TSS(F)
TO BE REMOVED	N/A	
WIND CONE		SAME

LEGEND FOR OPTIONS TO RESOLVE HOT SPOT 1

LEGEND ITEM	FUTURE
AIRSIDE PAVEMENT - OPTION 1	
PAVEMENT TO BE REMOVED - OPTION 1	
AIRSIDE PAVEMENT - OPTION 2	
PAVEMENT TO BE REMOVED - OPTION 2	
NAVAID CRITICAL AREA - OPTION 1	
RUNWAY PROTECTION STANDARD/THRESHOLD SITING SURFACE - OPTION 2	OPT 2

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: S.C.
CH: T.D.
APP: T.D.

ISSUE RECORD

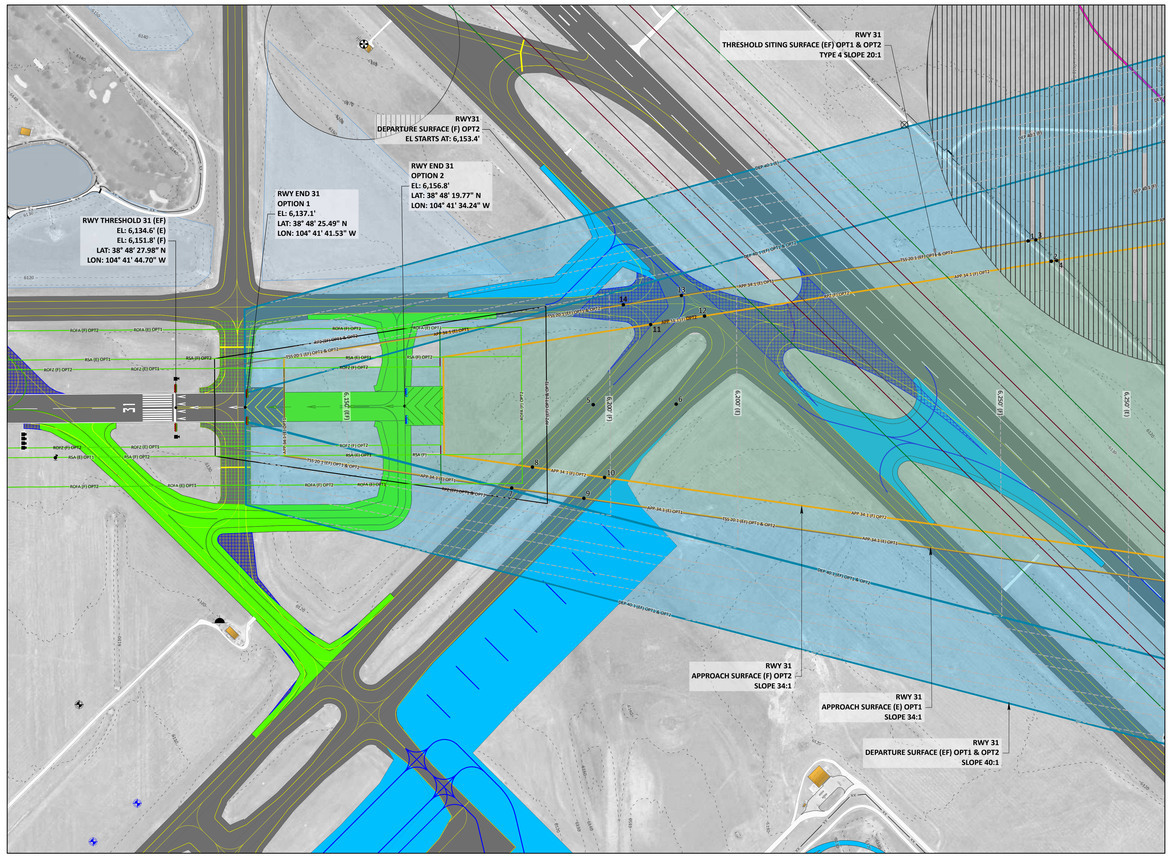
NO.	BY	DATE	DESCRIPTION

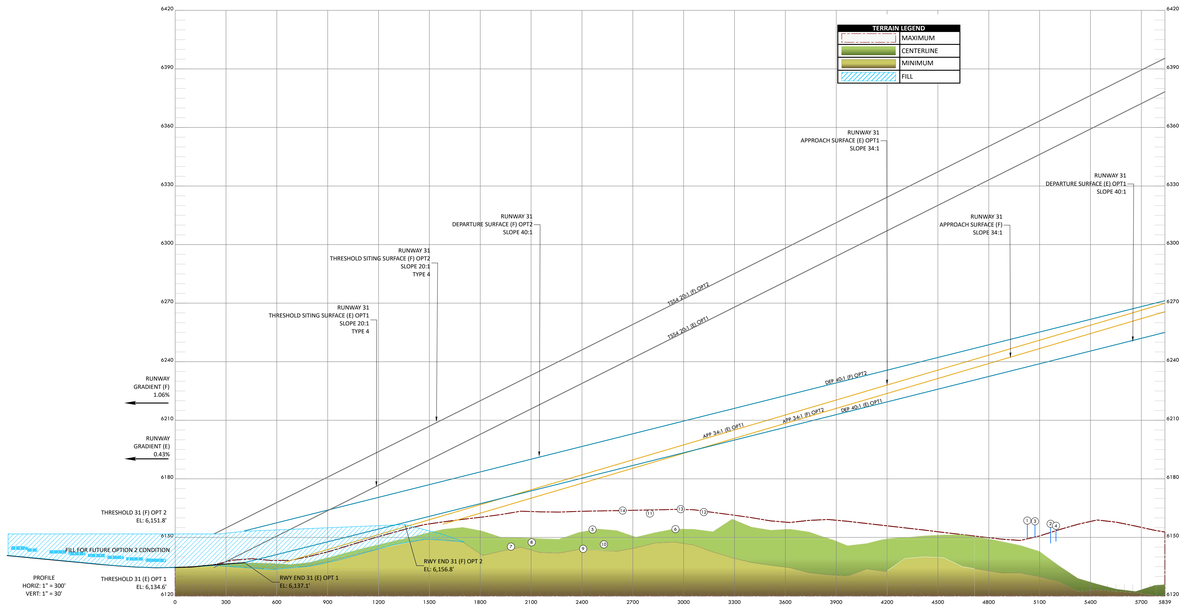
2022 AIRPORT LAYOUT PLAN

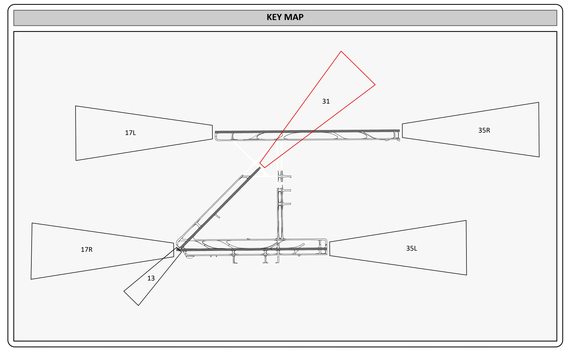
INNER PORTION OF THE APPROACH AND DEPARTURE SURFACE DRAWING 13

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: DECEMBER 2022

SHEET NO. 15 of 18

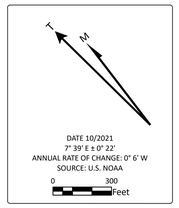






RUNWAY 31 FUTURE P77 APPROACH AND DEPARTURE SURFACE OBSTRUCTION TABLE

REF #	OBJECT TYPE	GROUND ELEVATION (MSL)	TOP OF OBJECT ELEVATION (AGL)	TOP OF OBJECT ELEVATION (MSL)	APPROACH SURFACE PENETRATION	DEPARTURE SURFACE PENETRATION	DISPOSITION
1	ACCESS CONTROLLED ROAD	6,148.6'	10.0'	6,158.6'	-89.9'	-95.1'	NONE
2	ACCESS CONTROLLED ROAD	6,147.0'	10.0'	6,157.0'	-91.5'	-99.7'	NONE
3	FENCE	6,150.3'	8.0'	6,158.3'	-90.7'	-96.4'	NONE
4	FENCE	6,148.0'	8.0'	6,156.0'	-93.2'	-101.4'	NONE
5	TAXIWAY	6,154.0'	-	6,154.0'	-25.2'	-43.8'	NONE
6	TAXIWAY	6154.2'	-	6,154.2'	-37.5'	-54.2'	NONE
7	TAXIWAY	6,145.3'	-	6,145.3'	-	-42.1'	NONE
8	TAXIWAY	6,147.5'	-	6,147.5'	-22.5'	-42.5'	NONE
9	TAXIWAY	6,144.2'	-	6,144.2'	-	-52.4'	NONE
10	TAXIWAY	6,146.4'	-	6,146.4'	-34.4'	-52.8'	NONE
11	TAXIWAY	6,162.3'	-	6,162.3'	-26.0'	-43.0'	NONE
12	TAXIWAY	6,163.0'	-	6,163.0'	-33.4'	-49.2'	NONE
13	TAXIWAY	6,164.5'	-	6,164.5'	-	-44.8'	NONE
14	TAXIWAY	6,163.8'	-	6,163.8'	-	-38.0'	NONE



SOURCES

- THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2021

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. ALL ROAD ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENTS OF 23' FOR RAILWAYS, 17' FOR INTERSTATE HIGHWAYS, 15' FOR OTHER PUBLIC ROADS AND 10' FOR PRIVATE ROADS
5. FILTERED OBSTRUCTIONS LEFT UNLABELED FOR MAP CLARITY DUE TO PROXIMITY TO MORE CRITICAL LABELED OBSTRUCTIONS
6. DRAWING DEPICTS ALTERNATIVE OPTIONS TO RESOLVE HOT SPOT 1, OPTION 1 BEING THE RELOCATION OF RUNWAY END 17R, OPTION 2 BEING THE RELOCATION OF RUNWAY END 13

LEGEND

LEGEND ITEM	EXISTING	FUTURE
AIRPORT PAVEMENT		
AIRPORT PAVEMENT MARKINGS		
AIRPORT PROPERTY BOUNDARY		SAME
AIRPORT REFERENCE POINT		
APPROACH SURFACE (34:1)	APP 34:1 (E)	APP 34:1 (F)
BUILDING (ON-AIRPORT)		SAME
DEPARTURE SURFACE (40:1)	DEP 40:1 (E)	DEP 40:1 (F)
FENCE (6' HEIGHT OR LESS)	6'	SAME
FENCE (8' HEIGHT OR LESS)	8'	SAME
GATE		SAME
LOCALIZER		SAME
NAVAID CRITICAL AREA		SAME
PACS OR SACS		SAME
PAPI		
PARKING AREA		SAME
REIL		
ROAD		SAME
ROTATING BEACON		SAME
RUNWAY END LIGHT		
RUNWAY OBJECT FREE AREA (ROFA)	ROFA(E)	ROFA(F)
RUNWAY OBJECT FREE ZONE (ROFZ)	ROFZ(E)	ROFZ(F)
RUNWAY PROTECTION ZONE (RPZ)	RPZ(E)	RPZ(F)
RUNWAY SAFETY AREA (RSA)	RSA(E)	RSA(F)
THRESHOLD SITING SURFACE (TSS)	TSS(E)	TSS(F)
TO BE REMOVED	N/A	
WIND CONE		SAME

LEGEND FOR OPTIONS TO RESOLVE HOT SPOT 1

LEGEND ITEM	FUTURE
AIRSIDE PAVEMENT - OPTION 2	
PAVEMENT TO BE REMOVED - OPTION 2	
PDFZ - OPTION 2	
RUNWAY PROTECTION STANDARD/THRESHOLD SITING SURFACE - OPTION 2	OPT 2

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: K.D.
DR: S.C.
CH: T.D.
APP: T.D.

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

INNER PORTION OF THE APPROACH AND DEPARTURE SURFACE DRAWING 31

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: DECEMBER 2022

SHEET NO. 16 of 18

DATE 10/2021
7° 39' E ± 0° 22'
ANNUAL RATE OF CHANGE: 0° 6' W
SOURCE: U.S. NOAA
0 400 800 1,200 Feet

55 DNL CONTOUR
60 DNL CONTOUR
70 DNL CONTOUR
75 DNL CONTOUR

RUNWAY 17L/35R (13,500'X150') (EF) TRUE BEARING: 180°04'38.62"
RUNWAY 17R/35L (11,022' X 150') (E) | (11,730' X 150') (F OPT1) (13,519'X150') (F OPT2) TRUE BEARING: 180°03'24.76"

RWY END 17L (EF)
EL: 6187.6'
LAT: 38° 48' 57.91" N
LON: 104° 41' 08.64" W

RWY END 35R RPZ (F)
INNER WIDTH: 1,000'
OUTER WIDTH: 1,750'
LENGTH: 2,500'

RWY END 35R (EF)
EL: 6102.7'
LAT: 38° 46' 44.51" N
LON: 104° 41' 04.87" W

RWY END 35R RPZ (E)
INNER WIDTH: 1000'
OUTER WIDTH: 1510'
LENGTH: 1700'

RWY END 31 (F) OPT2
LAT: 38° 48' 19.77" N
LON: 104° 41' 34.24" W

RWY END 31 (EF) OPT1
LAT: 38° 48' 25.49" N
LON: 104° 41' 41.53" W

RWY 31
DISPLACED THRSHOLD (EF)
EL: 6,173.1' (F)
LAT: 38° 46' 27.98" N
LON: 104° 41' 44.70" W

ATCT TO BE RELOCATED

RWY END 13 (F) OPT2
EL: 6,171.3'
LAT: 38° 49' 16.40" N
LON: 104° 42' 46.46" W

RWY END 13 (EF) OPT1
EL: 6178.5'
LAT: 38° 49' 23.86" N
LON: 104° 42' 55.28" W

RWY END 17R (F) OPT1
EL: 6157.1'
LAT: 38° 49' 08.98" N
LON: 104° 42' 57.24" W

RWY END 17R (EF) OPT2
EL: 6176.4'
LAT: 38° 49' 26.67" N
LON: 104° 42' 57.22" W

RWY END 35L (F)
EL: 6,033.1'
LAT: 38° 47' 13.06" N
LON: 104° 42' 57.39" W

RWY END 35L (E)
EL: 6045.0'
LAT: 38° 47' 37.77" N
LON: 104° 42' 57.36" W

DISPLACED THRESHOLD (F)
RWY END 35L
EL: 6,037.0'
LAT: 38° 47' 20.72" N
LON: 104° 42' 57.38" W

EAST AERONAUTICAL DEVELOPMENT
ECONOMY PARKING
RELOCATED ATCT
RELOCATED AIRFIELD MAINTENANCE
RENTAL PARKING TO BE RELOCATED
ECONOMY PARKING
PEAK INNOVATION PARK NON-AERONAUTICAL DEVELOPMENT
PEAK INNOVATION PARK NON-AERONAUTICAL DEVELOPMENT
CONTRAC
WEST AERONAUTICAL
AIRFIELD MAINTENANCE TO BE RELOCATED

LEGEND

LEGEND ITEM	EXISTING	FUTURE
AIRPORT PROPERTY BOUNDARY		SAME
AIRPORT PAVEMENT MARKINGS		
AIRPORT PAVEMENT		
TO BE REMOVED	N/A	
ROAD		
PARKING AREA		SAME
ON-AIRPORT BUILDING		
OFF-AIRPORT BUILDING		SAME
WATER FEATURE		
APZ-1 / APZ-2	N/A	
NAVAID CRITICAL AREA		
PRECISION OBJECT FREE ZONE (POFZ)		
RUNWAY PROTECTION ZONE (RPZ)		
RUNWAY SAFETY AREA (RSA)		
RUNWAY OBJECT FREE AREA (ROFA)		
RUNWAY OBJECT FREE ZONE (ROFZ)		
BUILDING RESTRICTION LINE (BRL 35')		SAME
FENCE (6' HEIGHT OR LESS)		
FENCE (8' HEIGHT OR LESS)		
GATE		
PACS OR SACS		SAME
AIRPORT REFERENCE POINT		
AIR TRAFFIC CONTROL TOWER (ATCT)		
LOCALIZER		
ROTATING BEACON		
GLIDE SLOPE ANTENNA		
AWOS		
RUNWAY END LIGHT		
PAPI		
REIL		
MALSR/ALSF-2		
WIND CONE		
NOISE CONTOUR DNL 55 DB		SAME
NOISE CONTOUR DNL 60 DB		SAME
NOISE CONTOUR DNL 65 DB		SAME
NOISE CONTOUR DNL 70 DB		SAME
NOISE CONTOUR DNL 75 DB		SAME

SOURCES

- THE SITE PLAN AND LINE WORK IS BASED ON THE PLANIMETRIC MAPPING INFORMATION COMPILED BY WOOLPERT, INC. 2022
- NOISE CONTOURS DERIVED FROM 2020 LAND USE STUDY COMPILED BY WOOLPERT, INC 2020. CONTOURS BASED ON ANNUAL SERVICE VOLUME

NOTES

1. EXISTING AND FUTURE CONDITIONS SHOWN AS (E)(F)
2. ALL HORIZONTAL COORDINATES - NAD83/2011
3. ALL VERTICAL COORDINATES - NAVD88
4. DRAWING DEPICTS ALTERNATIVE OPTIONS TO RESOLVE HOT SPOT 1, OPTION 1 BEING THE RELOCATION OF RUNWAY END 17R, OPTION 2 BEING THE RELOCATION OF RUNWAY END 13

ON AIRPORT LAND USE

AIRPORT USE AREAS
- Airfield Area
- Airline Support
- Airport Support
- Cargo
- Commercial
- General Aviation
- Light Industrial/ Manufacturing
- Military
- Open Space
- Strategic Reserve
- Terminal

OFF AIRPORT LAND USE

LAND USE
- AGRICULTURAL
- COMMERCIAL
- INDUSTRIAL
- PLANNED UNIT DEVELOPMENT
- PUBLIC FACILITIES
- RESIDENTIAL
- SPECIAL USE
- UNDETERMINED
- PUBLIC PARKS
- PUBLIC SCHOOLS
- CHURCHES

LOCAL GOVERNMENT BOUNDARIES
- COLORADO SPRINGS
- CITY OF FOUNTAIN

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COLORADO SPRINGS AIRPORT

COLORADO SPRINGS AIRPORT (COS) COLORADO SPRINGS, CO

DES: S.J.
DR: K.D.
CH: T.D.
APP: T.D.

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION

2022 AIRPORT LAYOUT PLAN

LAND USE DRAWING

AIP PROJECT NUMBER: 3-08-0010-071-2021
JVIATION PROJ. NO. 2020.COS.01
DATE: JANUARY 2023

SHEET NO. 17 of 18

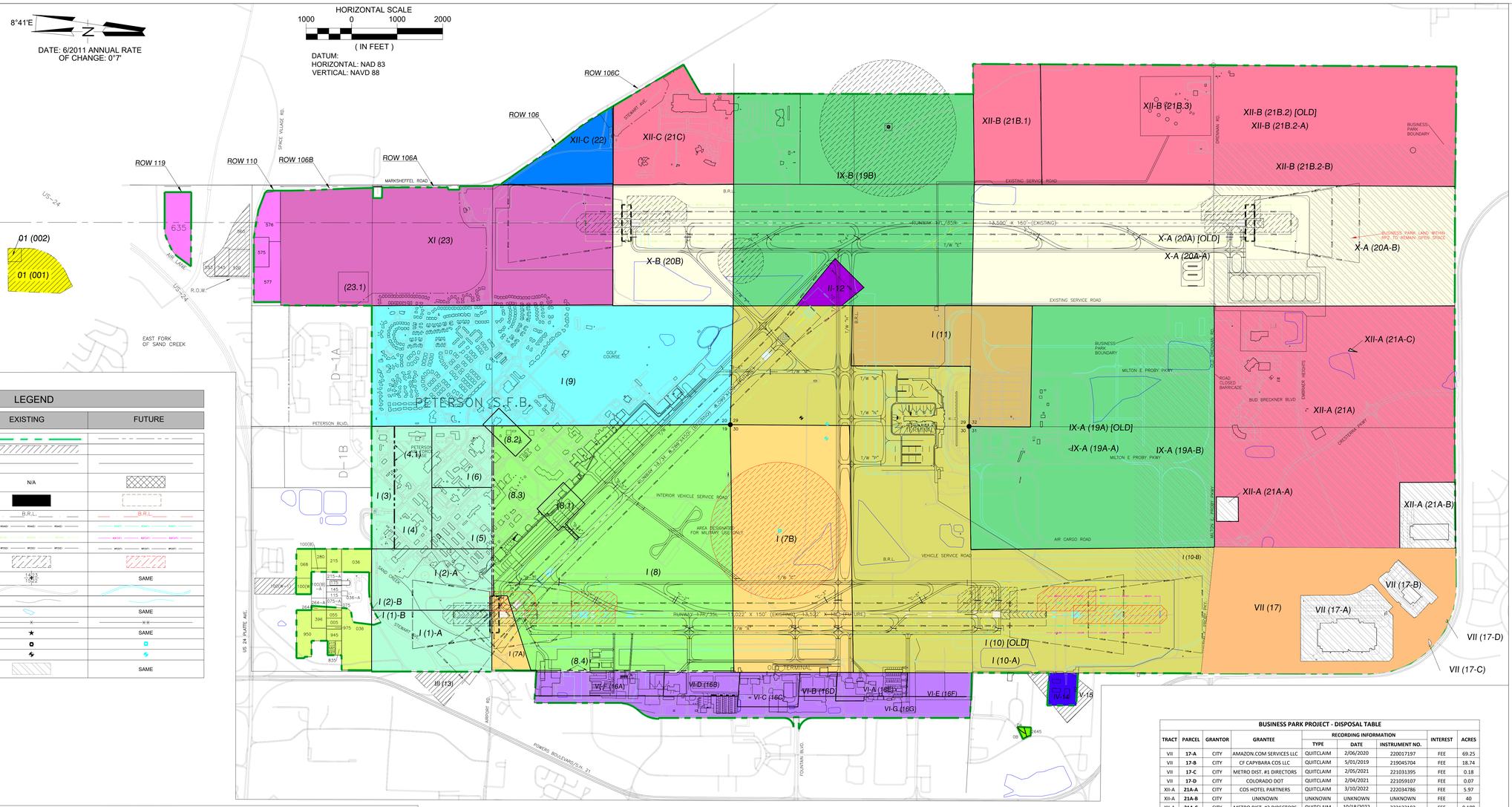
8°41'E

N

DATE: 6/2011 ANNUAL RATE OF CHANGE: 0°7'

HORIZONTAL SCALE
1000 0 1000 2000
(IN FEET)

DATUM:
HORIZONTAL: NAD 83
VERTICAL: NAVD 88



LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
EASEMENTS		
PAVEMENT/ AIRPORT DEVELOPMENT SITE		
AIRFIELD PAVEMENT	N/A	
BUILDINGS		
BUILDING RESTRICTION LINES	B.R.L.	B.R.L.
RUNWAY SAFETY AREA	RSA(1) RSA(2) RSA(3) RSA(4)	RSA(1) RSA(2) RSA(3) RSA(4)
RUNWAY OBJECT FREE AREA	ROFA(1) ROFA(2) ROFA(3) ROFA(4)	ROFA(1) ROFA(2) ROFA(3) ROFA(4)
RUNWAY PROTECTION ZONE	RPZ(1) RPZ(2) RPZ(3) RPZ(4)	RPZ(1) RPZ(2) RPZ(3) RPZ(4)
NAVAID CRITICAL AREA		
SECTION CORNER		SAME
ROADS AND PARKING AREAS		
GROUND CONTOURS		
PONDS, LAKES, STREAMS, ETC		SAME
FENCE LINE	X	X X
AIRPORT BEACON	★	★
AIRPORT SECURITY RADAR (ASR)	◘	◘
AIRPORT REFERENCE POINT		
BUSINESS PARK		SAME

AIRPORT PROPERTY TABLE

TRACT	PARCEL	GRANTOR	GRANTEE	RECORDING INFORMATION TYPE	LIBER	DATE	BOOK	PAGE	INTEREST	ACRES	FEDERAL PROJECT	PURPOSE OF ACQUISITION	
I	1		CITY			5/14/1942	1004	545	FEE	80.86	9-05-020-6201	AIRPORT DEVELOPMENT	
I	2		CITY			7/24/1941	1004	196	FEE	81.95	9-05-020-6201	AIRPORT DEVELOPMENT	
I	3		CITY			6/18/1942	1004	548	FEE	30.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
I	4		CITY			6/10/1942	1004	545	FEE	50.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
I	4.1		CITY			UNKNOWN			R-O-W	0.90	NON-FED	-	
I	5		CITY			3/26/1941	1004	64	FEE	41.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
I	6		CITY			11/5/1937	935	540	FEE	41.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
I	7A		CITY			12/26/1942	1019	212	FEE	22.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
I	7B		CITY			12/26/1942	1019	212	FEE	326.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
I	8		CITY			10/24/1927	847	207	FEE	627.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
I	8.1		USA			4/14/1977	2914	6	UNKNOWN	13.39	NON-FED	-	
I	8.2		CITY			7/9/1968	UNKNOWN		UNKNOWN	11.48	NON-FED	-	
I	8.3		CITY			UNKNOWN			R-O-W	2.62	NON-FED	-	
I	8.4		CITY			UNKNOWN			R-O-W	3.01	NON-FED	-	
I	9		CITY			6/1/1942	1004	533	FEE	477.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
I	10		CITY			5/18/1942	1004	516	FEE	890.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
I	10-A		CITY							879.00	-	-	
BP	10-B		CITY			*Released for Business Park development.*				11.00	-	-	
I	11		CITY			3/15/1943	1019	339	FEE	160.00	9-05-020-6201	AIRPORT DEVELOPMENT	+
II	12		CITY			11/19/1963	1988	989	FEE	18.60	9-05-020-6205	APPROACH PROTECTION (RPZ)	+
III	13		PRIVATE			11/12/1964	2043	961	AVIG. EASEMENT	11.50	9-05-020-6205	APPROACH PROTECTION (RPZ)	
IV	14		CITY			5/3/1961	1857	152	FEE	10.00	9-05-020-6206	APPROACH PROTECTION (RPZ)	+
V	15		PRIVATE			8/5/1960	1842	143	AVIG. EASEMENT	19.50	9-05-020-6206	APPROACH PROTECTION (RPZ)	
VI-F	16A		CITY			7/22/1968	2244	688	FEE (1/2)	34.00	8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY			7/22/1968	2244	682	FEE (1/4)		8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY			7/22/1968	2244	684	FEE (1/4)		8-08-0010-01	AIRPORT DEVELOPMENT	+
VI-D	16B		CITY			7/18/1966	2140	308	FEE (1/2)	20.00	8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY			7/18/1966	2140	311	FEE (1/2)		8-08-0010-01	AIRPORT DEVELOPMENT	+
VI-C	16C		CITY			9/9/1970	2363	759	FEE (1/4)	23.00	NON-FED	-	+
			CITY			7/30/1965	2086	33	FEE (1/2)		NON-FED	-	+
			CITY			7/30/1965	2086	34	GIFT (1/2)		NON-FED	-	+
VI-B	16D		CITY			7/18/1966	2140	308	FEE (1/2)	10.00	8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY			7/18/1966	2140	311	FEE (1/2)		8-08-0010-01	AIRPORT DEVELOPMENT	+
VI-A	16E		CITY			6/1/1967	2182	725	FEE	20.00	8-08-0010-01	AIRPORT DEVELOPMENT	+
VI-E	16F		CITY			7/22/1968	2244	688	FEE (1/2)	16.00	8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY			7/22/1968	2244	682	FEE (1/4)		8-08-0010-01	AIRPORT DEVELOPMENT	+
			CITY			7/22/1968	2244	684	FEE (1/4)		8-08-0010-01	AIRPORT DEVELOPMENT	+
VI-G	16G		CITY			1/10/1968	2217	5	FEE (1/4)	77.00	NON-FED	-	+
			CITY			9/9/1970	2363	759	FEE (1/4)		NON-FED	-	+
			CITY			12/21/1972	2548	401	FEE (1/4)		NON-FED	-	+
			CITY			1/15/1973	2553	928	FEE (1/4)		NON-FED	-	+
	17		CITY			11/6/1970	2374	7	FEE	327.00	8-08-0010-02	APPROACH PROTECTION/AIRPORT DEV.	
VII	17		CIDC			10/8/1985	5072	143	UNKNOWN	17.80	NON-FED	-	
BP	17		CITY			*Released for Business Park development.*				309.20	-	-	
VII	18		PRIVATE			UNKNOWN			AVIG. EASEMENT	67.00	8-08-0010-02	APPROACH PROTECTION/AIRPORT DEV.	
	19A		CITY			7/19/1974	2691	839	FEE	574.00	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
IX-A	19A-A		CITY				-			415.00	-	-	
BP	19A-B		CITY			*Released for Business Park development.*				159.00	-	-	
IX-A	19B		CITY			7/19/1974	2691	839	FEE	544.00	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
	20A		CITY			12/17/1976	2882	189	FEE	644.53	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	
X-A	20A-A		CITY							418.00	-	-	
BP	20A-B		CITY			*Released for Business Park development.*				226.00	-	-	
X-B	20B		CITY			12/17/1976	2882	189	FEE	161.92	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+

AIRPORT PROPERTY TABLE

TRACT	PARCEL	GRANTOR	GRANTEE	RECORDING INFORMATION TYPE	LIBER	DATE	BOOK	PAGE	INTEREST	ACRES	PROJECT	PURPOSE OF ACQUISITION	
XII-A	21A		CITY			12/23/1977	2993	386	FEE	640.00	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
XII-B	21B.1		CITY			12/23/1977	2993	386	FEE	90.00	8-08-0010-07	APPROACH PROTECTION/AIRPORT DEV.	+
	21B.2		CITY			12/23/1977	2993	386	FEE	550.00	8-08-0010-08	APPROACH PROTECTION/AIRPORT DEV.	+
XII-B	21B.2-A		CITY							438.00	-	-	
BP	21B.2-B		CITY			*Released for Business Park development.*				112.00	-	-	
XII-C	21C	COS LAND HOLDING CORP	CITY	SPEC. WARRANTY DEED	389696	12/23/1977	2993	386	FEE	160.00	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
XII-C	21C		CIDC			10/8/1985	5072	143	FEE	17.18	NON-FED	-	
XII-C	22	CENTENNIAL INVESTMENT	CITY	DEED	01308753	10/8/1985	5072	142	FEE	53.16	NON-FED	LAND PROPERTY EXCHANGE/AIRPORT DEV.	+
XI	23	COLUMBIA CORP.	CITY	DEED	176485	9/11/1975	2776	520	FEE	541.00	8-08-0010-05	APPROACH PROTECTION/AIRPORT DEV.	+
	23	CITY	USA	QUITCLAIM DEED	581341	7/30/1979	3207	902	AVIG. EASEMENT	170.86	NON-FED	APPROACH PROTECTION/AIRPORT DEV.	
	23.1	SCHOOL DIST. 11	CITY	SPEC. WARRANTY DEED		2/24/2021	221037253		FEE	11.20	NON-FED	APPROACH PROTECTION/AIRPORT DEV.	
	001		PRIVATE			9/28/1995	6608	1404	DEV. RIGHTS	23.94	3-08-0010-20	NOISE COMPATIBILITY	
	002		PRIVATE			9/28/1995	6608	1404	DEV. RIGHTS	2.54	3-08-0010-23	NOISE COMPATIBILITY	
*	03		CITY			7/23/1992	6013	81	FEE	5.00	3-08-0010-12	NOISE COMPATIBILITY	+
	03	576 JOHN VALENTINE LEONE	CITY	WARRANTY DEED	002175836	7/23/1992	6013	81	FEE	10.86	3-08-0010-19	APPROACH PROTECTION	+
	03	577	CITY			7/23/1992	6013	81	FEE	15.66	NON-FED	-	+
	03	560	CITY			10/19/1993	6286	1498	FEE	6.50	3-08-0010-15	NOISE COMPATIBILITY	
EX			PRIVATE			7/17/1996	RECEPTION NO. 96088831		AVIG. EASEMENT	7.74	NON-FED	-	
	03	520	CITY			7/28/1993	6223	308	FEE	9.97	3-08-0010-15	NOISE COMPATIBILITY	
			PRIVATE			12/1/1995	6774	1228	AVIG. EASEMENT	6.00	NON-FED	-	
	03	545	CITY			7/1/1993	6205	538	FEE	2.26	3-08-0010-17	NOISE COMPATIBILITY	
EX			PRIVATE			12/1/1995	6774	1230	AVIG. EASEMENT	4.00	NON-FED	-	
	03	ROW	EL PASO CTY			6/2/1999	RECEPTION NO. 99087783		R-O-W	0.35	NON-FED	-	
	03	553	PRIVATE			UNKNOWN	UNKNOWN		DEV. RIGHTS	2.94	3-08-0010-17	NOISE COMPATIBILITY	
*	03	635 BANK ONE COLORADO	CITY	WARRANTY DEED	99001268/69	1/5/1999	B-2	64	FEE	19.62	3-08-0010-23	NOISE COMPATIBILITY	+
*	08	036	CITY			7/8/1992	6005	798	FEE	24.03	3-08-0010-12	NOISE COMPATIBILITY	
*	08	215	CITY			10/13/1993	6282	1357	FEE	3.75	3-08-0010-17	NOISE COMPATIBILITY	
*	08	075	CITY			7/8/1996	RECEPTION NO. 96088833		FEE	0.42	3-08-0010-23	NOISE COMPATIBILITY	
*	08	055	CITY			7/17/1996	RECEPTION NO. 96088832		FEE	1.23	3-08-0010-23	NOISE COMPATIBILITY	+
*	08	005	CITY			4/22/1993	6157	951	FEE	1.23	3-08-0010-15	NOISE COMPATIBILITY	+
*	08	975	CITY			6/5/1992	5988	639	FEE	0.46	3-08-0010-12	NOISE COMPATIBILITY	+
*	08	945	CITY			6/16/1992	5993	740	FEE	1.71	3-08-0010-12	NOISE COMPATIBILITY	+
*	08	835	CITY			5/13/1992	5976	1131	FEE	1.00	3-08-0010-12	NOISE COMPATIBILITY	+
*	08	915	CITY			3/19/1992	5949	565	FEE	0.44	3-08-0010-17	NOISE COMPATIBILITY	+
*	08	885	CITY			7/31/1992	6016	715	FEE	0.44	3-08-0010-14	NOISE COMPATIBILITY	+
*	08	865	CITY			2/8/1993	6118	1311	FEE	0.44	3-08-0010-15	NOISE COMPATIBILITY	+
*	08	950	CITY			6/23/1992	5997	492	FEE	9.97	3-08-0010-14	NOISE COMPATIBILITY	+
*	08	396	CITY			1/21/1998	RECEPTION NO. 98007480		FEE	2.97	3-08-0010-23	NOISE COMPATIBILITY	+
*	08	264	CITY			7/28/1993	6223	306	FEE	0.56	3-08-0010-15	NOISE COMPATIBILITY	
*	08	100(B)	CITY			4/13/1994	6424	1122	FEE	0.61	3-08-0010-17	NOISE COMPATIBILITY	
*	08	100(W)	CITY			1/3/1994	6350	195	FEE	10.00	3-08-0010-14	NOISE COMPATIBILITY	+
	08	100(W)	CITY			*Retained*				2.50	3-08-0010-14	NOISE COMPATIBILITY	+
EX		100(W-1)	PRIVATE			10/16/1996	RECEPTION NO. 96132238		AVIG/ACCESS ESMT	7.13	-	-	
*	08	280	CITY			9/14/1993	6259	494	FEE	3.19	3-08-0010-15	NOISE COMPATIBILITY	+
*	08	068	CITY			10/8/1996	6259	494	FEE	4.46	3-08-0010-14	NOISE COMPATIBILITY	+
	09	0A	CITY			5/4/2005	-	-	FEE	0.38	-	AVIATION WAY CULVERT	+
	09	08	CITY			5/9/2007	-	-	FEE	0.31	-	AVIATION WAY CULVERT	+
	09	2645	CITY			5/4/2005	-	-	FEE	0.54	-	AVIATION WAY CULVERT	+

BUSINESS PARK PROJECT - DISPOSAL TABLE

TRACT	PARCEL	GRANTOR	GRANTEE	RECORDING INFORMATION TYPE	DATE	INSTRUMENT NO.	INTEREST	ACRES
VII	17-A	CITY	AMAZON.COM SERVICES LLC	QUITCLAIM	2/06/2020	220017197	FEE	69.25
VII	17-B	CITY	CF CAPYBARA COS LLC	QUITCLAIM	5/01/2019	219045704	FEE	18.74
VII	17-C	CITY	METRO DIST. #1 DIRECTORS	QUITCLAIM	2/05/2021	221031395	FEE	0.18
VII	17-D	CITY	COLORADO DOT	QUITCLAIM	2/04/2021	221059107	FEE	0.07
XII-A	21A-A	CITY	COS HOTEL PARTNERS	QUITCLAIM	3/10/2022	222034786	FEE	5.97
XII-A	21A-B	CITY	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	FEE	40
XII-A	21A-C	CITY	METRO DIST. #3 DIRECTORS	QUITCLAIM	10/18/2022	222133182	FEE	0.108

MARKSHEFFEL ROAD SOUTH CORRIDOR IMPROVEMENT PROJECT - DISPOSAL INFORMATION

TRACT	PARCEL	ROW PARCEL #	FAA RELEASE DATE	APPROVED LAND USE CHANGE	DISPOSAL ACREAGE	PUBLIC LAND REFERENCE (PLR) ASSESSOR #	BOOK	PAGE	ENCUMBRANCES
XIII-C	21C	106C	7/27/2015	PUBLIC RIGHT-OF-WAY	1.286	-	2993	386	RIGHT-OF-FLIGHT
XIII-C	22	106	7/27/2015	PUBLIC RIGHT-OF-WAY	3.057	-	5072	142	RIGHT-OF-FLIGHT
XI	23	106A	7/27/2015	PUBLIC RIGHT-OF-WAY	1.216	-	2776	520	RIGHT-OF-FLIGHT
	23	106B	7/27/2015	PUBLIC RIGHT-OF-WAY	2.995	-	2776	520	RIGHT-OF-FLIGHT
03	576	110	7/27/2015	PUBLIC RIGHT-OF-WAY	0.676	-	2776	520	RIGHT-OF-FLIGHT
03	635	119	7/27/2015	PUBLIC RIGHT-OF-WAY	0.332	99001268 & 99001269	-	-	RIGHT-OF-FLIGHT

VECTOR SITE PROJECT - DISPOSAL INFORMATION

TRACT	PARCEL	FAA RELEASE DATE	APPROVED LAND USE CHANGE	DISPOSAL ACREAGE	PUBLIC LAND REFERENCE (PLR) ASSESSOR #	BOOK	PAGE	ENCUMBRANCES
08	036-A	7/14/2017	NON-AERONAUTICAL	14.58	-	6005	798	RIGHT-OF-FLIGHT
08	215-A	7/14/2017	NON-AERONAUTICAL	1.25	-	6282	142	RIGHT-OF-FLIGHT
08	175	7/14/2017	NON-AERONAUTICAL	1.04	-	6225	520	RIGHT-OF-FLIGHT
08	145	7/14/2017	NON-AERONAUTICAL	1.04	-	5978	520	RIGHT-OF-FLIGHT
08	115	7/14/2017	NON-AERONAUTICAL	1.04	76085758	-	-	RIGHT-OF-FLIGHT
08	075-A	7/14/2017	NON-AERONAUTICAL	1.54	76088833	-	-	RIGHT-OF-FLIGHT
08	264-A	7/14/2017	NON-AERONAUTICAL	1.37	-	6223	306	RIGHT-OF-FLIGHT
08	100(B)-A	7/14/2017	NON-AERONAUTICAL	4.39	-	6424	1122	RIGHT-OF-FLIGHT
I	1-B	7/14/2017	NON-AERONAUTICAL	1.14	-	1004	545	RIGHT-OF-FLIGHT
I	2-B	7/14/2017	NON-AERONAUTICAL	.05	-	1004	196	RIGHT-OF-FLIGHT

NOTES:

1. All graphic information, except for boundary lines, Tables, notes and details about land parcels, was imported from data provided by Isbill Assoc., Inc. (file name: cos-alp.Dwg, dated: 6/16/97)
2. This is not a plat nor boundary survey. The information presented was assembled from land transactions of records provided by the city of Colorado Springs and its consultants.
3. Recorded information after 980701 contains reception numbers in place of book and pages.
4. All property disclosure brought forward from the 2005 Exhibit "A".
5. Multiple plats exist within the Colorado Springs Airport boundary:

   Colorado Springs Airport and Industrial Park Filing No. 1 – Reception No. 94150256
   Colorado Springs Airport and Industrial Park Filing No. 2 – Reception No. 94150257
   Colorado Springs Airport Filing No. 1 – Reception No. 201029279
   Colorado Springs Airport Filing No. 1A – Reception No. 209712938
6. Multiple parcels purchased by Colorado Springs Airport have been disposed of through conversion to AIP Eligible uses, exchanged as part of the Noise Land Reuse Plan or released for development of the Airport Business Park. Disposed of parcels are identified in the parcel table with the following symbols:

   * These Noise Land parcels have been disposed through conversion to AIP–eligible land use for approach and departure protection. Noise Land Reuse Plan Accepted by FAA on June 30, 2010.

   EX These Noise Land parcels have been disposed through exchange. Noise Land Reuse Plan accepted by FAA on June 30, 2010.

   BP These parcels have been released for long–term development associated with the Airport Business Park. FAA Land Release for Leasing Plan accepted on January 10, 2006.

   + These parcels have been included to calculate the acres owned by the City of Colorado Springs. Sales and transactions listed below the initial purchase of the indicated parcels have been subtracted from the acreage calculation. The acreage calculated from the data totals 7,444 acres.

COLORADO SPRINGS AIRPORT MASTER PLAN 2021

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration (Project Number 3–08–0010–49) as provided under Title 49 U.S.C., Section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws."

CITY OF COLORADO SPRINGS MUNICIPAL AIRPORT
COLORADO SPRINGS, COLORADO
Airport Master Plan

JVIATION
A WOOLPERT COMPANY

ISSUE RECORD

NO.	BY	DATE	DESCRIPTION
1	J.A.R.	12/15	REVISED ALP
2	RS;H	8/18	REVISED ALP
3	JVI	12/22	REVISED ALP

E.R. PROJECT NUMBER: WVXY4800 | DATE: 12/2022

DESIGNED:	DRAWN:	CHECKED:	APPROVED:
	J.G.N.	T.D.	T.D.

DRAWING PATH\NAME:
\---\PLANS\
COS_Exhibit A_JN.dwg

REFERENCE DRAWING PATH\NAME:
\---\---\XREF\...

EXHIBIT 'A' AIRPORT PROPERTY INVENTORY MAP

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7. Financial Implementation Plan

Introduction

This chapter of the Airport's Master Plan Update (MPU) presents the financial implementation analysis for Colorado Springs Airport (COS or the Airport) and examines various facets of the financial operating condition of the Airport. In addition, this chapter reviews the Airport's historic operating revenues and expenses and provides estimates for future financial results. The goal of this chapter is to contextualize the financial implications associated with carrying out projects recommended in this Master Plan.

The projections of airport revenues and expenses focus on the three planning periods of this MPU's Capital Improvement Program (CIP): Phase I (short/intermediate term), Phase II (intermediate/long-term), and Phase III (long-term). Specific years for the development of recommended projects are not included in these phases, as their consideration should be determined more by demand and planning activity levels. These planning periods provide a framework for the Airport's financial support for future capital projects: either by contributing local share of costs in coordination with FAA and Colorado Department of Transportation (CDOT) grants, reimbursement of Passenger and Customer Facility Charges, through other miscellaneous grants, or by wholly funding the projects. The CIP and associated financial plan included in this chapter are informed by circumstances and conditions that were current when this Master Plan Update was completed. Ultimately, capital projects will be undertaken when demand warrants and as appropriate funding becomes available.

The financial implementation analysis was comprised of the following efforts:

- Gathered and reviewed key Airport documents related to historical financial results, CIPs, operating budgets, regulatory requirements, and Airport policies.
- Interviewed key Airport management personnel to gain an understanding of the existing operating and financial environment, as well as the overall financial management philosophy.
- Reviewed the MPU CIP, project cost estimates, and development schedule anticipated for the three planning periods to project the overall financial requirements to implement the CIP.
- Identified and analyzed the sources and timing of capital funding available to meet the financial requirements for funding the CIP.

- Analyzed historical and budgeted operating expenses, developed operations and maintenance expense assumptions, and projected future operating costs for the planning periods.

- Analyzed historical and budgeted operating revenues, developed operating revenue assumptions, and projected future operating revenues for the planning periods.

- Completed results of the analysis and evaluation in a Financial Plan Summary that provides conclusions regarding the financial feasibility of the CIP.

Airport budgets can be broadly categorized as capital improvements and operating and maintenance (O&M). Grants issued by the FAA and CDOT are generally restricted to capital improvement projects, and, with few exceptions, cannot be used for airport O&M expenses. Operating revenues generated by aircraft landing and parking fees, fuel flowage fees, land and building leases, etc. can be applied to both capital improvements and O&M expenses.

Capital Funding Sources

The implementation of COS's Master Plan CIP is anticipated to be funded primarily through the following sources:

- FAA grants from its Airport Improvement Program (AIP)

- State of Colorado funding sources

- Local funding sources

- Other capital project funding sources, such as private parties

Federal Aviation Administration Grants

Airports included in FAA's National Plan of Integrated Airport Systems (NPIAS) are eligible to receive FAA grants. The FAA is the most significant source of funding for the construction of airport projects. Following World War II, the federal government recognized the need to develop airports to meet the nation's long-term aviation needs and initiated a Grants-In-Aid Program.

Following a series of federal airport funding programs, the Airport Improvement Program (AIP) was established by Congress on behalf of the FAA through the Airport and Airway Improvement Act of 1982. The initial AIP legislation provided funding through the fiscal year 1992, but since then the AIP has been reauthorized and amended multiple times, most recently through the FAA Reauthorization Act of 2018. The current AIP program was authorized for five years through FY 2023 (September 30, 2023). Congress will need to authorize a new AIP program or pass continuing resolutions for the FAA to continue issuing grants after that date.

Funds obligated for the AIP are drawn from the Airport and Airway Trust Fund. The trust fund receives revenue through user fees on aviation fuels, airline ticket sales, and air freight shipments. It is designed to support the improvement of the country's air transportation system by funding airport improvements, airport repair projects, and air traffic control system modernization.

AIP grants are generally available for planning, development, or noise compatibility projects at public-use airports included in the NPIAS. Eligible projects are those that enhance airport safety, capacity, security, and environmental concerns. In Colorado, the FAA provides 90 percent funding for eligible projects at airports that are not large or medium hubs. COS is a small hub airport and thus can receive up to 90 percent funding for eligible projects.

Sponsors can leverage AIP funds for most airfield capital improvements, and in limited situations, for terminals, hangars, and non-aviation development. Professional services required for eligible projects, such as planning, surveying, and design, may be eligible for AIP funds. In most cases, an airport's demand for capital improvements must be quantified and documented (i.e, through an airport master plan process), each project must be shown on an approved Airport Layout Plan (ALP), and projects must meet appropriate Federal environmental and procurement requirements.

Projects related to revenue-generating improvements (such as privately owned or leased hangars and aprons) are typically not eligible for AIP funding, nor are standard airport operations and maintenance costs (salaries, equipment, supplies, etc.). Operating revenues generated by aircraft landing and parking fees, fuel flowage fees, land and building leases, etc. can be applied to both capital improvements as well as O&M expenses.

AIP grants are generally divided into two categories: entitlements and discretionary. Entitlement grants are allocated among NPIAS airports through a formula largely driven by passenger enplanements, landed cargo weights, and types of operations. Currently, "primary" airports—defined in the NPIAS as having a level of commercial air service (i.e., enplane more than 10,000 passengers per year)—receive $1,000,000 annually in entitlement funding. "Non-primary" airports, which include small commercial service airports and general aviation airports, are currently eligible for $150,000 of annual entitlement funding. Under current legislation, the AIP will typically provide 90 percent of the total cost of an FAA-eligible capital project for all airports other than large or medium hubs (with the remaining balance often covered through a combination of state and local funding), though this remaining percentage can be reduced based on the size, complexity, and requirements of a specific project.

As defined in the most current version of FAA Order 5100.38D, *Airport Improvement Program Handbook*, AIP grants must be expended within four years of their issue, or they will be returned to the FAA. Like entitlements to individual airports, each state receives an annual apportionment from the FAA based on an area-population formula. As these federal funds may be utilized at the discretion

of each individual state, the State of Colorado uses this money to support capital projects at general aviation airports within the state.

In addition to entitlement grants, the AIP distributes discretionary grants since the capital requirements of airports often will exceed the limits of their annual entitlement funding. National discretionary funding levels are established annually by the FAA and are available after the distribution of entitlements. Generally, airports compete for these discretionary grants, which are awarded based on the priority ratings assigned to each potential project by the FAA. The prioritization process makes certain that the projects the FAA views as important and beneficial are allotted adequate discretionary funding and are the first to be completed. Each NPIAS airport project is subject to eligibility and justification requirements as part of the AIP funding process.

Under the current AIP authorization legislation and based on its inclusion as a Small Hub Airport in the NPIAS, COS is currently eligible to receive entitlements of roughly $3,500,000 per year through the planning period. Additional financing is anticipated to be realized through AIP discretionary funding, based on the project eligibility ranking methodology and available federal funding.

State of Colorado Funding Sources

CDOT Aeronautics' mission statement lays out the agency's commitment to "support Colorado's multi-modal transportation system by advancing a safe, efficient, and effective statewide aviation system through collaboration, investment, and advocacy." In support of that goal, CDOT Aeronautics provides funding assistance to airports within the state through two primary mechanisms.

First, CDOT Aeronautics provides a five percent matching grant to any airport that receives a federal AIP grant. As noted previously, AIP currently provides funding up to 90 percent of an eligible project cost, with the balance being the responsibility of the airport sponsor.

Second, CDOT Aeronautics collects aviation fuel taxes and automatically disburses 65 percent of those collections back to the airports of origin as regular entitlement funds. 35 percent of the fuel tax collections are funneled into the Colorado Discretionary Grant Program, which is distributed by the Colorado Aeronautical Board. These grants are disbursed on a discretionary basis to Colorado's 74 public-use airports for maintenance, capital equipment, and developmental needs. Under this program, CDOT Aeronautics can reimburse an airport sponsor for up to 90 percent of the total project cost.

No state general funds are used to meet the needs of CDOT Aeronautics' operations or the Colorado Aviation System. After 65 percent of fuel taxes are disbursed back to the airports, the remaining funds are used to fund the Division of Aeronautics' administrative costs, which are capped at five percent of the prior year's total revenue. The remaining funds are then distributed under the Colorado Discretionary Grant Program described above.

Local Funding Sources

Local funding is typically generated from an airport's operating revenues and generally consists of user lease, fuel sale, and service fees. The user fees are typically established by the airport based on market conditions in the area and vary from airport to airport. COS has several revenue generating sources:

- Aircraft fuel sales
- Hangar leases
- Land leases
- Tie-down fees
- Other operating revenues
- Non-operating revenues, such as return on investments, interest payments, etc.

Landside facility development and levels of aviation activity are typically the primary factors affecting airport operating revenues. These revenues will normally increase as a function of usual inflationary growth as well as average annual increases associated with existing leases. Additional airport development will often increase the operational levels and number of based and itinerant aircraft. In general, land and building leases provide the most stable long-term sources of revenue at an airport, as fuel sales, tie-down rates, and other operational fees will fluctuate with traffic levels. Commercial service airports, unlike general aviation airports, typically generate some revenue from auto parking, concessions, and terminal building tenants.

It is important to recognize that while the Colorado Springs Airport is owned by the City of Colorado Springs, it is financially operated and managed as an enterprise fund. An enterprise fund is an operational model used by many municipal resources and services to promote and maintain long-term financial sustainability whereby the Airport effectively operates as a business and must be financially self-sustaining without receiving any local taxes or general fund monies. The City currently uses enterprise funds to account for its airport, cemetery, development review, golf course, Memorial Health, parking system, Pike's Peak – America's Mountain fund, and stormwater system.

As an enterprise fund, COS utilizes an accounting and financial reporting mechanism that places revenues and expenditures into a fund with financial statements separate from all other municipal activities. This system identifies total direct and indirect maintenance costs, as well as the sources and amounts of revenues that support the facility and services. Direct costs like personnel services, expenses, and capital outlay are budgeted and accounted for in the enterprise fund. Indirect costs are expenditures budgeted and accounted for in the general fund and allocated to the enterprise fund. Examples of indirect costs

are central service department costs (accounting, treasury, collections, law, and the like), insurances, and fringe benefits that are budgeted and accounted for as an estimate in cooperation with the general fund.

With respect to the airport, this has resulted in its operation as a self-funded and financially self-sustaining entity; thus, COS does not receive any direct financial support from the City of Colorado Springs. Aside from the airport's rates and charges, the airport actively leases airport property for non-aeronautical use as a revenue stream. This revenue stream is used to supplement capital financial needs, and over time, may ultimately be used to lower fees for aeronautical users.

Future development at the Airport shall continue to be self-funded by users of the airport and aviation system; no local taxes will be used to fund Airport capital improvements.

Other Capital Project Funding Sources

The traditional funding sources described in previous sections (FAA grants, CDOT grants, and airport revenue) often fall short of the financing required the full range of capital projects programmed for development during a CIP. In addition, some projects are not eligible for FAA or state grants. When the availability of traditional funding is lacking, other non-traditional sources need to be investigated and possibly utilized, for the ultimate implementation of projects. In this chapter, these sources have collectively been referenced as "Other Funding Sources." If funding sources cannot be identified and obtained in the time frames planned, the associated projects would necessarily be delayed until appropriate funding can be identified and secured.

Non-traditional funding sources for an airport typically include general fund revenues, bond issues, and private funding. Of these, general fund revenues and general obligation bonds are by far the most common funding sources, particularly at commercial service airports. The debt level and ability of municipalities and counties to finance additional debt governs their ability to issue general obligation bonds for airport capital projects. As the debt burden increases, rating agencies often lower the institution's credit ratings, which increases their interest payments.

Private funding sources (FBOs, aircraft owners, investors, etc.) often cover the cost of hangars and fuel storage tanks, and, less often, of parking aprons, taxiways, and utility hookups. However, when private parties make capital investments in airports, they often try to negotiate reduced land and/or building lease rates to balance spending. Additionally, the private part may can seek to avoid property reversion clauses—whereby ownership facilities constructed on an airport ultimately revert to the airport after a set period (often a minimum of 20 years).

Passenger Facility Charges

The Passenger Facility Charge (PFC) Program allows publicly owned commercial airports to collect fees up to $4.50 per flight segment for each eligible passenger. PFCs are added onto the price of the airline ticket and distributed back to the airport to fund FAA-approved projects that enhance safety, security, or capacity; reduce noise; or increase carrier competition. PFC funds can be leveraged as an entity's matching share of an AIP project or utilized to fund a project independently of the AIP. Of the 80 Small Hub airports in the country currently collecting PFCs, 79 of them, including COS, collect the maximum allowable amount of $4.50 per enplaned passenger.

Customer Facility Charges

A Customer Facility Charge is a user fee imposed by an airport on each rental car user, which is collected by rental car companies. These revenues are used for capital and financing costs of rental-car related projects, like consolidated rental car facilities (CONRACs) and other roadway projects. COS currently collects a fee of $2.50 per rental day.

General Fund Revenues

General fund revenues are those provided by the airport sponsor (municipality or state) from their general tax revenues. Airport capital development expenditures from general fund sources have been somewhat difficult to obtain in recent years. One reason for this difficulty is the seemingly universal shortfall, and associated uncertainty, in local general fund revenues. The amount of general fund support for airport improvement projects varies by airport and is generally based upon the local tax base, the credit rating of the municipality and state, the priority of the development project, historical funding trends, and, of course, local attitudes concerning the importance of aviation. As an enterprise fund for the City of Colorado Springs, COS operates as a self-funded and financially self-sustaining entity—it does not receive any direct funding support from the City nor is any anticipated in the future.

Bond Funds

Since the mid-1990s, the use of various types of municipal securities (bonds) has increased significantly. Municipal securities are a generic term for interest-bearing obligations issued by state and local governmental entities to finance capital costs. These funding instruments are generally broken down into the following categories: general obligation bonds, revenue and special facility bonds, hybrid source bonds, and industrial development and exempt facility bonds.

Because COS is owned by a municipality, it's bond issues must compete with other government departments/divisions (schools, road, sewer, etc.) for attention and consideration by City leadership. As with the general fund apportionment, bond issues supporting airport development depend greatly on

the priority assigned to such projects by the local community. At the time of this MPU, COS has no outstanding debt from bonding sources or otherwise.

Private Funds

Items such as hangars, fuel systems, and pay parking lots are not typically eligible for federal or state grant funding because they generate income for the airport and thereby fail to meet the requirements for such funding as defined in Chapter 3 of FAA Order 5100.38D. Communities sometimes work with FBOs or other local businesses to fund these types of improvements. Each of these options would need to be weighed independently for appropriateness of their application for eligible projects.

Additional Funds

In addition to all the funding sources listed in this section, COS explores a wide variety of grants to improve airport facilities, like Charge Ahead Colorado grants, which provide funds for electric charging stations. COS strives to find creative funding mechanisms to improve the airport without drawing from the general fund or local tax dollars.

Financial Analysis and Implementation Plan

This section, along with the tables presented at the end, illustrate the effort to analyze the financial feasibility of CIP implementation during the planning period.

Capital Improvement Program (CIP)

This section lists and briefly describes the projects identified in this MPU recommended for inclusion in COS's CIP. The individual projects are listed in order of their CIP identifying letter (CIP IDs are used for tracking only and do not indicate priority) and all projects are assumed to require some level of federal, state, and/or local funding, unless otherwise indicated. Note that this listing is the best estimate of anticipated projects at the time of this MPU. Because future requirements and demands may change the scope or timing of these projects, the CIP must be reviewed, assessed, and updated on a regular basis (typically annually). Additionally, each project will require environmental documentation prior to execution.

Phase 1

A. Taxiway Enhancements: This group of projects include multiple airfield taxiway connector improvements intended to meet FAA requirements and recommendations.

1. **Taxiway A Separation**: This project will include a shift of Taxiway A from Runway 17R/35L from 400 feet to 500. Connector modifications from the Taxiway to the Runway are also included.

2. **Reconstruct Taxiway A1:** As part of the shift of Taxiway A, it is also recommended that Taxiway A be extended to the end of Runway 17R to enhance access to the runway.

3. **Relocate Taxiway E2:** Relocating Taxiway E2 will reduce taxiway convergence and provide an appropriate taxiway bypass configuration serving Runway 17L.

4. **Relocate Taxiway E4:** High-speed Taxiway E4 will be relocated to the south to reduce taxiway convergence and help address Hot Spot 3.

5. **Relocate Taxiway B Entrance:** Taxiway B, where it meets Taxiway E will be reconfigured to reduce taxiway convergence and help address Hot Spot 3.

B. Runway Decoupling – Shift Runway 13-31: This project shifts Runway 13-31 southeast to decouple the runway safety area from that of Runway 17R-35L. This project also includes associated taxiway connector improvements.

C. Construct CONRAC Facility and Transform Existing Rental Car Parking into Short-Term Parking Lot: This project relocates rental car facilities into a consolidated rental car facility accessed via Peak Innovation Parkway, west of the terminal. This project relocates the existing rental car parking lot and transforms the lot into short-term parking.

D. Westside Development

1. **Consolidate General Aviation Fuel Farm:** This project entails consolidating the general aviation fueling facilities into one, centralized location.

2. **Expand General Aviation Ramp:** This project expands the apron on the westside of the airfield and is tied to the redevelopment of Taxiway A to better utilize space and accommodate more diverse aircraft. Various connectors from the apron to Taxiway A will be removed or added to meet FAA guidance. Various in-fill hangar development within vacant spaces within the Westside Development Area will be added.

E. **Consolidate/Relocate SRE/Airfield Maintenance Center:** This project would relocate the existing airfield maintenance shop to construct a consolidated snow removal equipment and airfield maintenance facility on the east side of the airfield. It is estimated that the cost of this project would be shared equally between the FAA and the Airport. That estimate may change based on the final design of the facility and funding availability.

Phase 2

F. **Expand Passenger Terminal:**

Stage 1: This stage of the Passenger Terminal Expansion creates a rounded structure at the end of the existing concourse, widens the existing terminal and expands the main terminal building resulting in additional gates, larger holdrooms, expanded concession areas, and more space for circulation, baggage claim, ticketing and passenger screening. It is estimated that this project would be funded by the FAA AIP at 70 percent, multiple years of State funding up to $1,000,000 and the remainder funded by the Airport. Those estimates may change through negotiations with the FAA and State based on funding availability.

G. **Relocate Airport Surveillance Radar (ASR):** This project relocates the ASR to within the airfield, between the runways. This project will require further study and consultation with the FAA. There is a possibility that this project could be funded by the FAA's Air Traffic Organization, Facilities and Equipment Division at 100 percent.

H. **Redevelop Existing Rental Turnaround Facilities into South Long-Term/Economy Parking Lot:** This project adds 57 acres of long-term or economy parking south of the existing lots. Rental car agency turnaround facilities would be relocated to the CONRAC.

I. **Develop East Deicing Apron:** This apron will free up space on the Airport's terminal apron and serve as the primary deicing apron for air carrier aircraft as well as storage/staging of deicing equipment and fluid.

Phase 3

J. **Expand Passenger Terminal**

Stage 2: This stage of the Passenger Terminal Expansion extends the concourse to create a Y-shaped configuration to utilize the depth of the apron space to produce additional aircraft gates. Phase 2 also includes an expansion of the apron to provide double width taxilanes around the terminal. The terminal's departure level vehicle road is expanded to

increase curb frontage and meet additional traffic/passenger demand. It is estimated that this project would be funded by multiple years of State funding up to $1,000,000 and the remainder funded by the Airport. Those estimates may change through negotiations with the FAA and State based on funding availability.

K. **Construct East Long-Term/Economy Parking Lot:** This project adds 30 acres of long-term or economy parking east of the existing lots.

L. **Relocate Airport Traffic Control Tower (ATCT):** This project relocates the ATCT from its current location north of the crosswind runway to just east of the terminal building. This project will require further study and consultation with the FAA. There is a possibility that this project could be funded by the FAA's Air Traffic Organization, Facilities and Equipment Division at 100 percent.

M. **Install MALSR / ALSF-2 on Runway 35R –** This project installs a Medium-intensity Approach Lighting System (MALSR) or Approach Lighting System with Sequenced Flashers II (ALSF-2) on Runway 35R in order to lower approach visibility minimums to that runway end. There is a possibility that this project could be funded by the FAA's Air Traffic Organization, Facilities and Equipment Division, but based on Airport input, this project is shown as 100 percent funded by the Airport.

N. **Extend Runway 35L:** This project extends Runway 35L 2,500 feet. This also includes corresponding extensions, connectors and high-speed exits to Taxiways A and C as well as extending the taxiway and runway lights and approach lighting system.

It is important to note the descriptions above and cost estimates below do not include the large-scale construction of hangars in the Westside Development Area's southern portion or hangars in the Eastside Area along Taxiway E. These areas will be preserved for aeronautical use due to their proximity to the primary runways and will feature large hangar facilities. The development of these areas is intended to accommodate large tenant aircraft, maintenance repair overall, and/or additional air cargo operators. Additional design work will be needed and based on tenant specifications. Therefore, cost estimates are not included and depend on the types of facilities built. Costs for development will primarily be the responsibility of the future tenant, to be determined.

Additionally, throughout the 20-year planning period, ongoing pavement and airfield maintenance projects will be required as needed. This includes pavement crack and seal or rehabilitation projects necessary to maintain a safe environment for aircraft operations. As part of ongoing airfield maintenance requirements, COS should regularly inspect airfield pavement and grounds to ensure that problem areas are addressed.

Estimated Project Costs and Development Schedule

A list of capital improvement projects has been assembled based on the preferred development alternatives for the Airport established in **Chapter Five** of this Master Plan. This project list has been illustrated on the ALP drawing set and documented on the CIP, both of which should be maintained and updated, as required, by Airport management. Generally, the CIP has three primary purposes:

1. Identify projects that will be required at the airport over a period of time.

2. Estimate the order of implementation of the projects.

3. Estimate the total costs and funding sources for each of the projects.

As the CIP progresses from project planning in the current year to projects planned in future years, the plan becomes less detailed and more flexible. Additionally, the CIP is typically modified on an annual basis as new projects are identified, priorities change, funding sources evolve, and financial environments develop.

Each proposed capital improvement project within the planning horizon has been assigned to one of three planning phases: Phase I (short/intermediate term), Phase II (intermediate/long-term), and Phase III (long-term). The assignment of these projects into appropriate periods are depicted in **Table 7-1** which shows all proposed CIP projects (including AIP-funded, State-funded, Airport-funded, and privately funded) and estimated costs. Detailed cost estimates are provided in the Appendix. As mentioned previously, reauthorization of the FAA AIP by Congress may change the funding formulas used in these tables. It is important to note that the cost estimates for the individual projects are based on 2022 dollars, with no escalation.

Table 7-1: Capital Improvement Program

CIP ID	Project	Estimated Capital Costs	Funding Sources			
			Federal	State	Local	Other/Private
Phase I						
A	Taxiway Enhancements					
	- Taxiway A Improvements	$87,124,342	$78,411,908	$4,356,217	$4,356,217	$0
	- Reconstruct Taxiway A1	$5,635,059	$5,071,553	$281,753	$281,753	$0
	- Relocate Taxiway E2	$5,810,075	$5,229,068	$290,504	$290,504	$0
	- Relocate Taxiway E4	$9,265,738	$8,339,164	$463,287	$463,287	$0
	- Relocate Taxiway B Entrance	$6,573,402	$5,916,062	$328,670	$328,670	$0
B	Runway Decoupling – Shift Runway 13-31	$63,931,234	$57,538,111	$500,000	$5,893,123	$0
C	Construct CONRAC facility and transform existing rental car parking into short-term parking lot	$66,967,586	$0	$0	$66,967,586	$0
D	Westside Development					
	- Consolidate general aviation fuel farm	$7,200,000	$0	$0	$7,200,000	$0
	- Expand general aviation ramp/hangars	$88,770,192	$72,243,173	$500,000	$7,527,019	$8,500,000
E	Consolidate/Relocate SRE/maintenance facility	$43,626,724	$21,813,362	$0	$21,813,362	$0
	Phase I Total	**$384,904,352**	**$254,562,400**	**$2,864,214**	**$118,977,739**	**$8,500,000**
Phase II						
F	Expand Passenger Terminal (Stage 1)	$232,486,947	$162,740,863	$1,000,000	$68,746,084	$0
G	Relocate Airport Surveillance Radar	$8,640,000	$8,640,000	$0	$0	$0
H	Redevelop rental turnaround facilities into south long-term/economy parking lot	$65,226,824	$0	$0	$65,226,824	$0
I	Develop Deicing Apron	$34,894,619	$31,405,157	$750,000	$2,739,462	$0
	Phase II Total	**$341,248,390**	**$202,786,020**	**$1,750,000**	**$136,712,370**	**$0**
Phase III						
J	Expand Passenger Terminal (Stage 2)	$271,970,568	$190,379,398	$1,000,000	$80,591,170	$0
K	Construct east long-term/economy parking lot	$33,800,644	$0	$0	$33,800,644	$0
L	Relocate airport traffic control tower	$75,600,000	$75,600,000	$0	$0	$0
M	MALSR / ALSF-2 for Runway 35R	$4,356,000	$0	$0	$4,356,000	$0
N	Extend Runway 35L by 2,500 feet	$103,269,000	$92,942,100	$1,250,000	$9,076,900	$0
	Phase III Total	**$488,996,212**	**$358,921,498**	**$2,250,000**	**$127,824,714**	**$0**
	Grand Total	**$1,215,148,954**	**$816,269,917**	**$6,864,214**	**$383,514,823**	**$8,500,000**

Source: Jviation

Note that the phasing of projects is established based on a combination of immediate needs (e.g., timing of required pavement reconstruction, meeting market demands, etc.), compliance with current airport safety design standards, advancing airport goals, and funding availability. Projects shown in Phase I include

those that are a higher priority to the airport's immediate needs, are timelier in nature, and/or are related to meeting FAA design standards. Projects included in Phase II and Phase III tend to have more flexibility in terms of their timing and some could be adjusted based on factors such as funding availability, conditions of pavements, market demands at that future time, etc.

The federal funding share for eligible AIP projects at COS is typically 90 percent with the State of Colorado providing a 5 percent matching share, which leaves the local share also at 5 percent. For some of the project, the funding share is different and based on revenue generating capability of the facility built or the department within the FAA that may be funding the project.

In response to the COVID-19 Pandemic, in March of 2020 the Coronavirus Aid, Relief, and Economic Security (CARES) Act was signed into law. The CARES Act included $10 billion in economic relief for airports affected by COVID-19. The law had several features designed to support airports. First, it provided funds to increase the federal share of discretionary grants in the AIP from 90 percent to 100 percent, eliminating the state and local shares for FY 2020. Second, the law provided new funds, characterized in size by the airport's role, to all NPIAS airports. Primary commercial service airports with more than 10,000 annual enplanements, including COS, received additional funds based on the number of enplanements. These funds could be used for any purpose for which airport revenues could be used, including operations and maintenance expenses. COS was allocated approximately $24.3 million in CARES Act grants.

As a follow-up in December of 2020, Congress also passed the Coronavirus Response and Relief Supplemental Appropriation Act (CRRSAA). This law included an additional $2 billion in funds for US airports in response to the Covid-19 pandemic. $1.75 billion was distributed similarly to the CARES act, which allocated approximately $4.3 million to COS.

In November of 2021, the President signed into law, the Bipartisan Infrastructure Law (BIL), with the goal of investing in and modernizing US infrastructure. The law included $15 billion for airport-related projects, beginning with a $2.89 billion investment for fiscal year 2022. The money can be invested in runways, taxiways, safety/sustainability, and other similar projects typically eligible through the AIP. These funds have been made available to airports around the nation, and COS has been allocated approximately $4.4 million for fiscal year 2022.

Based on the CIP presented above, approximately $816.3 million in federal funds will be required to complete all the projects. Federal funding assistance for projects within each phase will exceed the approximately $3,500,000 annual entitlements given to COS and will require the use of combined entitlements and discretionary funds. Additionally, state funding requirements for this CIP will total approximately $6.9 million, and local funding requirements will exceed $383.5 million. Finally, local private investment in the form of hangars, aprons, etc. over the planning is anticipated to be $8.5 million. This does not include large-scale hangar development that may be constructed by maintenance, cargo and/or other future tenants.

Airport Operating Revenues and Expenses

Airport revenues are typically generated through user fees charged by a given airport for the facilities and services that it provides. These user fees are normally established by that airport based on the market conditions within its service area and can vary dramatically from airport-to-airport. At COS, operating revenues are realized through several sources:

- Aircraft Fuel Sales
- Ground/Land Leases
- Tiedown/Ramp Fees
- Landing Fees
- Concessions
- Rental Car Fees
- Public Parking Fees
- Other miscellaneous sources

As additional airport development occurs, the number of based aircraft and itinerant aircraft operations should reasonably be expected to increase, resulting in a commensurate increase in airport operating revenues (revenues associated with fuel sales, aircraft tiedowns and landing fees are directly influenced by traffic levels). Additionally, as new leases are enacted and existing leases are updated to reflect prevailing rates and terms, the Airport's largest source of revenue, Peak Innovation Park, will continue to grow over the long term.

Ideally, operating revenues will at least offset the airport's O&M costs. Airport operating expenses do not include non-cash and capital costs associated with depreciation and infrastructure development. Primary components of O&M costs at COS include, but are not limited to, the following elements:

- Salaries/Benefits/Pensions
- Operating
    - Maintenance
    - Repairs
    - Utilities
    - Materials and Supplies

The historical operating revenues and expenses for COS between 2016 and 2021 are presented below in **Table 7-2**. It should be noted that due to the COVID-19 pandemic and the subsequent CARES Act Funding, figures from 2020 differ substantially from other years.

Table 7-2: Airport Operating Revenues and Expenses (Historical)

Operating Revenues	2016 (Actual)	2017 (Actual)	2018 (Actual)	2019 (Actual)	2020 (Actual)	2021 (Amended)
Airline Revenue	$3,977,979	$1,265,977	$2,605,332	$3,306,907	$3,277,577	$2,757,745
Non-Airline Revenue						
Public Parking	$4,066,573	$4,798,717	$4,832,888	$5,035,849	$2,319,380	$2,783,896
Rental Car	$3,205,439	$3,437,573	$3,742,655	$3,768,534	$2,668,003	$2,464,443
Terminal Concessions	$860,893	$984,567	$1,211,935	$1,350,156	$728,786	$688,271
Interest Income	$584,482	$387,700	$412,714	$376,278	$100,950	$212,734
Ground/Building Rent	$1,962,816	$1,997,160	$2,731,970	$2,480,188	$2,479,940	$1,704,697
Other Income	$4,209,264	$2,484,588	$4,226,661	$9,142,190	$2,405,525	$1,793,240
Peak Innovation Park	-	-	-	-	$7,055,907	$17,237,205
Other Revenue	-	-	$15,066,560	$3,904,312	$3,948,720	$4,073,612
Operating Revenue Total	**$18,867,446**	**$15,356,282**	**$34,830,715**	**$29,364,414**	**$24,984,788**	**$33,715,843**
Capital Revenue						
Customer Facility Charge	-	-	$1,380,999	$1,649,085	$334,271	$897,600
Passenger Facility Charge	-	-	$3,527,661	$3,440,636	($2,932,105)	$1,685,040
Capital Revenue Total	-	-	**$4,908,660**	**$5,089,721**	**($2,597,834)**	**$2,582,640**
All Revenue Total	**$18,867,446**	**$15,356,282**	**$39,739,375**	**$34,454,135**	**$22,386,954**	**$36,298,483**
Operating Expenses						
Salary/Benefits/Pensions	$6,815,213	$7,146,800	$7,990,704	$8,487,618	$1,220,449	$849,519
Operating	$5,767,235	$6,467,860	$16,526,317	$13,400,506	$4,466,059	$14,394,186
Transfers to Other Funds	$3,589,972	$2,319,961	-	-	-	-
Capital Outlay	$151,008	$116,521	$257,256	$228,009	$72,541	$290,574
Debt Service	$2,000,000	-	$294,603	$101,857	$329,588	$1,549,433
Total	**$18,323,428**	**$16,051,142**	**$25,068,880**	**$22,217,990**	**$6,088,637**	**$17,083,712**

Source: Colorado Springs Airport Budget

The amount of land leased, the lease rates charged, and levels of aviation activity that generate fuel sales, landing fees, aircraft parking, and other user fees are the primary factors affecting operating revenues at the Airport. In 2021, the Peak Innovation Park supported roughly 27 percent of the airport's operating revenues, followed by a group of fees categorized as "other revenue" which

typically comprises approximately 22 percent. Public parking provides approximately 14 percent of airport operating revenue.

At COS, operating expenses, like maintenance, repairs, utilities, and materials, account for the largest percentage of annual expenses at roughly 85 percent, followed by Salaries/Benefits/Pensions at six percent. The table shows that the COVID-19 pandemic produced budget anomalies in 2020 and that revenues are increasing due to the new/expanded carrier service and the leases from Peak Innovation Park. Lastly, revenues far exceed expenses, which may allow for additional project funding.

Airport Rates and Charges

The Airport accepts AIP grants and must therefore abide by 39 FAA Grant Assurances. It is important that the Airport continue to consider the applicable guidelines with respect to the future establishment of lease rates and other income-generating fees:

- FAA grant assurance number 22, Economic Nondiscrimination, states: "It (i.e., the airport sponsor) will make the airport available as an airport for public use on reasonable terms and without unjust discrimination to all types, kinds and classes of aeronautical activities, including commercial aeronautical activities offering services to the public at the airport."

- FAA grant assurance number 22 also states that the sponsor will charge, "reasonable and not unjustly discriminatory prices," and will also ensure that airport tenants who enter into an agreement with the sponsor will: "furnish said services on a reasonable, and not unjustly discriminatory, basis to all users."

- Additionally, FAA grant assurance 22 states: "Each fixed-based operator at the airport shall be subject to the same rates, fees, rentals, and other charges as are uniformly applicable to all other fixed-based operators making the same or similar uses of such airport and utilizing the same or similar facilities."

- FAA strongly encourages airport sponsors to set rates and charges that will make an airport financially self-sustaining as possible given the circumstances at that airport.

- The airport sponsor will not use/include any FAA grants in establishing fees, rates, and charges for users of that airport.

- The airport sponsor will permit no exclusive right for the use of the airport by any person providing, or intending to provide, aeronautical services to the public. However, the airport sponsor may choose to provide any commercial aeronautical service on an exclusive basis.

- The FAA considers any lease with a term of greater than 20 years to be long-term; a lease of 50 years or greater may violate FAA policy (source: FAA Order

5160.9B, Airport Compliance Manual). FAA generally considers 50-year lease terms as equivalent to the sale of airport property, which FAA allows only under very specific circumstances, and considers 50-year lease terms as infringing on the powers of the sponsor. The FAA recommends that lease terms extend no longer than the end of the amortization period and/or useful life of the facility.

The FAA requires airport sponsors to charge fair market value (FMV) for leases with non-aeronautical tenants. the agency allows the airport sponsor to determine FMV, which may be calculated using several different techniques: appraisals, comparable assessments, and compensatory or cost recovery systems.

When setting new or adjusting existing rates and charges, airports and their tenants are bound not just by FAA policies, but also by market forces. Airports and FBOs operate in a very competitive environment, and aviation users are price sensitive. As a result, while airport sponsors and the FAA may set a priority on achieving financial self-sufficiency, setting rates and charges on aeronautical users to achieve that goal may adversely impact the level of activity at the airport if competing airports and FBOs have lower rates and charges.

The FAA does not maintain a database of rates and charges set by airports. Some state aeronautics agencies (including Wyoming, Montana, Florida, Wisconsin, and Massachusetts) have undertaken statewide surveys of airport rates and charges, and individual airports also conduct surveys of adjacent airports and FBOs. However, most rates and charges surveys are typically not updated regularly. The rates and charges surveys reveal that there is little consistency between airports:

- Within each state, airport rates and charges can vary widely. Landing charges, tie-down and fuel flowage fees, land and building leases, etc. range from none to many dollars per item.

- Some airports impose a wide variety of fees, while others charge relatively few fees.

- Some airports update their rates and charges regularly, while other airports rarely change their rates and charges.

- Additionally, most surveys do not include the actual amount of revenue generated by each fee within a given fiscal year, what percent of total revenue is generated by each fee, or whether each airport is financially self-sufficient based on their rates and charges.

Several factors affect what rates and charges an airport can impose:

- The lease agreements in place affect an airport's ability to impose new fees and/or change existing fees. While the FAA provides guidance on leases

between airports and tenants, it does not review and comment on leases unless specifically requested to do so.

- Some airports own all or most of the buildings, while others have relied on private investment to construct, operate, and improve buildings and other facilities on the airport. Leases also have a bearing on this issue; some airport leases have reversion clauses whereby all improvements constructed by a third party revert to airport ownership at the end of the lease term, while other airports do not.

- The amount of property available for both aeronautical and non-aeronautical development can affect revenue generation potential. For example, some airports that have large amounts of surplus property that generate significant revenue each year. This surplus may keep airfield rates and charges relatively low, which enhances their competitive standing among area airports. COS' leasing of land in Peak Innovation Park is an excellent example of this phenomenon.

- The airport's ability and/or its FBO to collect and track fees may influence rates and charges. Some airports choose not to impose landing or tie-down fees because they do not have the staff or resources for collection. Also, the cost to collect the fees may exceed the revenue generated.

- The level of competition from area airports and FBOs.

- The demand for aviation facilities and services within a given market area, including short and long-term trends in specific aviation sectors such as airline service, general aviation activity, and military activity.

Given those variables, caution must be used when considering other airport rates and charges as guidance. Because the economy is constantly changing, it is important for COS to be vigilant in ensuring that its rates and charges are appropriate for area market conditions. Rates and charges at COS are shown in **Table 7-3**.

Table 7-3: Airport Rates and Charges (2021)

Categories	Fee
Landing Fees	
Signatory Operating Fees	
Signatory Landing Fee	$1.33 per 1000lbs MGLW
Signatory Maintenance/Ferry Landing Fee	$0.67 per 1000lbs MGLW
Signatory Diversion Landing Fee	$0.67 per 1000lbs MGLW
Non-Signatory Scheduled	
Scheduled Non-Signatory Landing Fee	$1.66 per 1000lbs MGLW
Scheduled Non-Signatory Maintenance/Ferry Landing Fee	$0.83 per 1000lbs MGLW
Scheduled Non-Signatory Diversion Landing Fee	$0.83 per 1000lbs MGLW
Non-Signatory Itinerant	
Itinerant Non-Signatory Landing Fee	$2.00 per 1000lbs MGLW

Categories	Fee
Itinerant Non-Signatory Maintenance/Ferry Landing Fee	$1.00 per 1000lbs MGLW
Itinerant Non-Signatory Diversion Landing Fee	$1.00 per 1000lbs MGLW
Ramp (Transient) Parking Fees	
City West General Aviation Ramp	
Per A/C MGLW 0-40,000	$10.00
Per A/C MGLW 40,001-100,000	$20.00
Per A/C MGLW 100,001-150,000	$25.00
Per A/C MGLW 150,001-200,000	$30.00
Per A/C MGLW 200,001-Greater	$50.00
Terminal North, East, West, Apron & Taxiway Parking	
< 3 hours on City Ramp per A/C	$69.00
> 3 hours on City Ramp per A/C per day	$138.00
Non-Preferential Gate and Bridge Usage	
Scheduled per use	$64.00
Itinerant per use	$65.00
City Ramp Parking & Gate Usage	
< 3 hours Scheduled Carriers per A/C per use	$120.00
< 3 hours Itinerant Carriers per A/C per use	$121.00
> 3 hours Scheduled Carriers per A/C per use	$189.00
> 3 hours Itinerant Carriers per A/C per use	$190.00
Terminal Building Fees	
Signatory Operating Fees	
Signatory Terminal Fee	$ 36.07 Per Sq./ft Annually
Signatory Loading Bridge Fee	$6,933 Annually
Dual Operation Parking Position	$5,199 Annually
Non-Signatory Scheduled	
Scheduled Non-Signatory Terminal Building sq./ft.	$45.09 per Sq./ft Annually
Scheduled Non-Signatory Small 300 sq./ft.	$5.00 per EP Operation
Scheduled Non-Signatory Large 600 sq./ft.	$9.00 per EP Operation
Scheduled Non-Signatory Small 800 sq./ft.	$12.00 per EP Operation
Scheduled Non-Signatory Large 1300 sq./ft	$20.00 per EP Operation
Scheduled Non-Signatory Ticket Counter & Bag Makeup - Small	$17.00 per EP Operation
Scheduled Non-Signatory Ticket Counter & Bag Makeup - Large	$29.00 per EP Operation
Non-Signatory Itinerant	
Itinerant Non-Signatory Joint Use per Enplanement Per Enplanement	$2.21 per Enplanement
Itinerant Non-Signatory Small 300 sq./ft. Ticket	$6.00 per EP Operation
Itinerant Non-Signatory Large 600 sq./ft. Ticket Counter	$11.00 per EP Operation
Itinerant Non-Signatory Small 800 sq./ft. Baggage Makeup	$15.00 per EP Operation
Itinerant Non-Signatory Large 1300 sq./ft. Baggage	$24.00 per EP Operation
Itinerant Non-Signatory Ticket Counter & Bag Makeup - Small	$21.00 per EP Operation
Itinerant Non-Signatory Ticket Counter & Bag Makeup - Large	$35.00 per EP Operation
Fuel Flowage Fee	
Per Gallon	$0.06

Source: Colorado Springs Airport

Additionally, COS has rates and charges for miscellaneous uses, including building rentals, cable TV services, telephone rates, and numerous administrative fees.

Airport Revenue Enhancement Considerations

As noted above, airports have a variety of revenue sources that provide multiple opportunities for revenue enhancement. Revenue generally falls into one of two categories:

- Aeronautical: tie-down, fuel flowage fees, aviation-related land leases, hangar and terminal rental, additional services, etc.
- Non-Aeronautical: non-aviation land leases, advertising, oil/mineral production, vehicle parking, etc.

When examining revenue enhancement opportunities, airports should ask themselves the following questions:

- How will a change in rates and charges negatively impact traffic? Most aviation users are price-sensitive and have alternative airports and/or FBOs they could use.
- Are new fees easy to collect and manage, and/or does the airport have the staff and resources to collect the fees? Many airports, for example, find that consistently collecting landing and tie-down fees are difficult and expensive. Airports often have FBOs collect the fees, only a fraction of which are returned to the Airport. Airports that have instituted a percentage of gross fee revenue, for example, find that auditing tenants to confirm annual income levels is time-consuming and expensive.
- Are new fees or increased rates and charges non-discriminatory? FAA grant assurances specifically require that airport rates and charges be "reasonable and not discriminatory."

Projected Operating Revenues and Expenses

The continued growth and demand of COS—in terms of activity, tenants, new leases, and facility development—will impact the Airport's operating revenues and expenses over the 20-year planning period. Projections developed in this evaluation depict future airport operating revenues and expenses based on recent financial results, budgeted revenues and expenses, forecasted increases in airport enplanements as well as aircraft activities and airport tenant population trends identified in previous chapters of this Master Plan. Projections of future airport operating revenues and expenses at COS for the periods 2022 through 2041 are presented below in **Table 7-4.**

Specifically, the estimates for future operating revenues were established through close consideration of historical trends, proposed airport development initiatives, anticipated passenger/aircraft activity and how they might impact those future revenues. In most instances, revenue projections resulted from normal, conservative growth factors refined to reflect the circumstances of the Airport. These revenues are projected to increase between 1.0 and 3.5 percent

annually, with an average at the standard 3.0 percent annual growth rate. The exception to these rates may be miscellaneous revenues that could be realized through the one-time sales of airport assets, such as easement rights or other assets. Additionally, since the Airport will likely continue to lease lands for future aeronautical and non-aeronautical development throughout the planning period, increased revenue growth associated with land leases was identified in selected years.

On the operating expenses side, increases in salaries, wages, and overall operational activities are based on accepted inflationary growth rates (ranging from 2.0 to 4.0 percent average annual growth) with the two percent growth factors being applied to personnel and three percent applied to maintenance costs, as provided by COS management.

Table 7-4: Airport Operating Revenues and Expenses (Projected)

Source of Funds	2022	2026 (Projected)	2031 (Projected)	2041 (Projected)
Airline Revenue	$4,351,774	$4,897,960	$5,678,078	$7,630,862
Non-Airline Revenue				
Public Parking	$7,985,427	$8,987,668	$10,419,171	$14,002,495
Rental Car	$5,022,038	$5,652,348	$6,552,621	$8,806,174
Terminal Concessions	$1,404,075	$1,580,299	$1,831,999	$2,462,054
Interest Income	$152,081	$171,169	$198,431	$266,675
Ground/Building Rent	$2,474,975	$2,785,606	$3,229,281	$4,339,884
Other Income	$2,322,964	$2,614,516	$3,030,941	$4,073,331
Peak Innovation Park	$3,000,000	$3,376,526	$3,914,320	$5,260,518
Other Revenue	$13,040,459	$14,677,151	$17,014,841	$22,866,524
Customer Facility Charge	$1,853,853	$2,086,528	$2,418,858	$3,250,742
Passenger Facility Charge	$3,611,151	$4,064,382	$4,711,733	$6,332,175
Total	**$45,218,797**	**$50,894,153**	**$59,000,274**	**$79,291,434**
Use of Funds				
Salary/Benefits/Pensions	$11,505,299	$12,453,706	$14,883,331	$21,682,203
Operating	$21,362,725	$24,043,935	$31,371,882	$55,010,785
Transfers to Other Funds	-	-	-	-
Capital Outlay	$269,778	$303,638	$351,999	$473,057
Debt Service	$222,637	$222,637	$445,306	-
Total	**$33,360,439**	**$37,023,916**	**$47,052,518**	**$77,166,045**

Source: Jviation, COS Budget. Debt Service figures represent average annual payments from 2022-2029, then average annual payments for 2030-2031, and no payments thereafter.

Financial Plan Summary

COS has a long history of self-sufficiency and does not receive funds from the City of Colorado Springs. This means that the Airport is fully self-sustaining and can fund many capital projects without the support of local tax revenues. Ongoing revenues will go toward supporting the continued development and operation of the Airport to meet the needs of Colorado Springs citizens, businesses, and tenants.

The primary goal for COS is to continue to operate as a facility that will best serve the evolving air transportation needs of the region while simultaneously maintaining itself as a self-sustaining economic generator for the City of Colorado Springs. This Airport Master Plan can best be described as the road map to helping the Airport achieve its goals. However, planning is a continuous process that does not end with the completion of the master plan. The fundamental issues that have driven this master plan will remain valid for many years, but will require updates to address on-going and changing needs. Therefore, the ability to continuously monitor the existing and forecast status of airport activity will be a key ingredient in maintaining the applicability and relevance of this study.

To realize those goals through the successful implementation of airport development projects, COS must make sound and measured decisions. Two of the most important factors in influencing the decision to move forward with a specific improvement are airport activity and funding availability. Both factors must be considered in the implementation of this master plan because while airport activity levels provide the “what” and the “why” in the establishment of airport improvements, the availability/timing of funding provides the “how.” The “what” and the “why” have been discussed in detail in previous chapters. This chapter has addressed the “how” by providing an overview of the practical financial realities required to implement this overall airport development program. While every effort has been made in this chapter to conservatively estimate when development may be required, aviation demand and the availability of financial resources for capital projects will ultimately dictate if facility improvements should be implemented, accelerated or delayed.

Based on the assumptions identified within the previous sections and subject to the availability of FAA funding, local funding, and the identification of other funding sources described in the analysis, implementation of the master plan CIP is financially feasible. However, the most significant concerns for implementation of this CIP is the availability of FAA discretionary funding and the identification of other funding sources beyond federal and local. Without those funding mechanisms, several projects must necessarily be shifted to later phases until funding is identified or is made available by accumulating airport revenue or grant funding.

Recycling, Reuse, and Waste Reduction Plan

Introduction and Background

As part of the FAA Modernization and Reform Act, signed into law in 2012, airports are required to address issues related to solid waste recycling in airport master plans. As such, the purpose of this Appendix to the Colorado Springs Airport Master Plan Update, is to review the Airport's current recycling, reuse, and waste program and suggest ways to reduce waste and improve recycling and reuse at the Airport.

The Airport is located at the foot of the Rocky Mountains' front range and in the southeast side of the City of Colorado Springs within El Paso County. The Airport is publicly owned by the City of Colorado Springs and open to the public. It provides the City, the County, and other communities within the region access to aviation facilities that accommodate a range of activities and users, including commercial airline service, general aviation operations, and military operations. A detailed airport description and background is available in the Airport Master Plan Update, completed in 2022.

Airport Operations

In 2020, the Airport supported 121,807 operations and 363,843 enplanements. Prior to 2008, COS consistently enplaned over 1 million annual passengers, and since that time, the economy and population have grown significantly. It is anticipated that operations and enplanements will fully recover from the effects of the COVID-19 Pandemic and continue to grow (as discussed in Chapter 3 of the Airport Master Plan Update).

The Airport is served by five different scheduled commercial air carriers: American, Delta, Frontier, Southwest, and United. Although airlines at COS have had wide and varied levels of enplanements, the expected population growth and the fundamental strength of the regional economy should drive air carriers to continue increasing their levels of passenger service.

Over the past 20 years, the share of air carrier operations at COS has generally declined, but stabilized at the 10 to 11 percent level over the past seven years (with the exception of 2020). Since 2015, the share of air taxi operations at COS has slowly grown from 8 percent to approximately 11 percent of total operations. Similarly, the share of general aviation operations at COS has steadily grown from 45 to 60 percent of total operations over the past six years.

Based Aircraft

As reported in the Airport's Master Record (FAA Form 5010), the number of based aircraft at COS has fluctuated, but generally increased over the past 20 years (see **Table 3-8** in **Chapter 3**). In 2021, the Airport was home to 251 based aircraft, most of which are single-engine aircraft. It is anticipated that the number of based aircraft will continue to increase.

Military Aircraft

The Airport plays a major role in military operations: as the host to Peterson Space Force Base (PSFB), and its proximity to other installations in the region. Peterson SFB occupies the northern portion of the airfield near Runway 13-31 and Taxiway B. Additional PSFB facilities are located east of Runway 17L-35R, but do not have airfield access.

It is expected that military operations at COS will return to pre-pandemic levels in the upcoming years. Given this likelihood, and the on-going interest by PSFB to expand into areas surrounding the Airport, the share of future military operations at COS are estimated to increase to 27 percent by the year 2041.

Existing Waste Sources

Identifying and analyzing an airport's sources of waste can be complicated. There are numerous groups, agreements, operational styles, and collection/disposal processes that play into the overall generation of waste at a given airport. The primary sources of waste at COS are listed below:

1. Airport Administration Offices
2. Airlines
3. Passengers
4. Rental Car Service Centers
5. Airfield Maintenance Shop
6. General Aviation Tenants
7. Airfield

The sources of waste, per the FAA's September 30, 2014 memo, can be further classified by the degree of control the Airport has on the generation and disposal of waste. There are three levels of control

1. Areas where the Airport has direct control of waste management (public space, office space, terminal building, airfield). The Airport controls these areas and can directly implement recycling, reuse, and waste reduction programs.

2. Areas where the Airport has no direct control but can influence waste management (tenants). These areas are owned by the Airport and leased out to tenants. The Airport can recommend that recycling, reuse, and waste reduction programs be used and can such include language in the tenant contracts but cannot realistically control what is done.

3. Areas where the Airport has no control or influence over waste management. These are areas the Airport neither owns nor leases (none of which are included in this chapter).

Table 0-1 lists the identified areas of waste generation, what waste is generated, how it is collected, amount of waste generated, and the Airport's level of control.

Table 0-1 Waste Generation

Area	Waste Generated	Collection process	Amount of Waste Generated	Control
Source 1: FBO's	Oil and batteries	Recycling vendors (i.e., Thermofluids, etc.)		No Direct Control but can Influence
Source 2: Hangars	Oil, batters, and tires	Picked up by or taken to recycling vendors		No Direct Control but can Influence
Source 3: Other GA Tenants	Scrap metal	Picked up by or taken to recycling vendors		No Direct Control but can Influence
Source 4: Terminal Area	Plastic bottles and containers, paper, paper cardboard, aluminum and other metal cans, glass bottles, lamps, electronics, batteries	Picked up by or taken to recycling vendors (Waste Mgmt., Veolia)	23.67 tons a month (8-month period) includes airlines/cargo	No Direct Control but can Influence
Source 5: Airlines/Cargo	Paper, plastic, aluminum	Airport recycling dumpster		No Direct Control but can Influence
Source 6: Rental Cars	Batteries, oil, oil filters, tires	Picked up by or taken to recycling vendors		No Direct Control but can Influence
Source 7: PSFB	Operate separately not tracked.			NA
Source 8: Airfield Maintenance	Used oil, antifreeze, solvents, lamps, batteries, electronic equipment, scrap metal	Picked up by or taken to recycling vendors		Direct Control
Source 7: Airfield				Direct Control

Source: Colorado Springs Airport, 2022

Waste Management Program

Airport Recycling

The Airport, as part of the City of Colorado Springs, contract with Waste Management to handle all waste, including recyclables. The current waste management program offers a single-stream recycling program where all recyclables can be commingled into one container and do not need to be separated. The Airport collects the following materials:

- Plastic bottles (#'s 1-7)
- Aluminum cans, foil and bakeware (with no food residue)
- Steel and tin cans (soup can, veggie cans, coffee cans, etc.)
- Corrugated cardboard
- Paperboard, office paper, magazines, and newspaper
- Glass bottles and jars

Recyclables are collected by the airport maintenance staff via recycling receptacles placed throughout the airport terminal. Recycling is then placed in one of three exterior dumpsters. These dumpsters are also available for tenants if they wish to recycle. Waste Management is contracted to remove the collected recyclables from the Airport.

The extent of recycling that occurs at COS is limited largely to the Airport itself. However, the Facilities/Attendant Supervisor is in the process of implementing new processes such as additional signage, education, and other opportunities to encourage participation and buy-in from tenants.

The location of recycling containers and dumpsters are depicted on **Figure 0-1**.

Figure 0-1: Recycling Locations

Source: COS
Note: Areas noted in green indicate recycling of tires, batteries, etc. and not necessarily commingled recycling

City and County Recycling

El Paso County and the City of Colorado Springs provide numerous recycling programs and opportunities for residents. The El Paso County Recycling Directory, found on the El Paso County website, offers instructions to properly recycle, compost, and dispose of household and commercial waste materials. The Directory also lists drop off-locations, times, and contact information for special material disposal.

Some unique City programs offer porcelain recycling or a free mulch pile to residents. The mulch program allows the city to dispose of excess mulch that residents can use at no extra cost. The porcelain recycling service accepts all types of fixtures including toilets, urinals, sinks, etc. The fixtures are recycled and reused as road base material in local paving operations.

Waste Audit

FAA guidance on the preparation of Airport Recycling, Reuse, and Waste Reduction Plans recommends that a waste audit be completed to identify and document the source, composition, and baseline quantity of airport waste streams. The Airport participated in a waste and recycling survey in 2017 as part of the Airport Cooperative Research Program's (ACRP) "Airport Waste and Recycling Practices" study[1]. Information from the study provides a baseline of recycling and waste management at COS.

Airport Recycling

The ACRP survey requested information regarding the type and quantity of recyclable material generated at COS. COS reported that approximately 172 tons of waste were generated by the Airport, of which approximately 4.9 percent was recycled. In 2021, as of November 9th, the Airport had generated approximately 252 tons of trash and 9 tons of recyclable material; approximately 3.51 percent of waste was diverted from landfills. It is likely that once the year is complete, the amount of diverted waste will be similar to what was reported in the ACRP survey.

The Airport reported that they recycle the following materials:

- Plastic bottles and containers
- Paper
- Paper cardboard
- Aluminum and other metal cans
- Glass bottles,
- Lamps
- Electronics
- Batteries

[1] "Airport Waste Management and Recycling Practices." Transportation Research Board, Airport Cooperative Research Program, 2018, https://www.trb.org/Publications/Blurbs/177866.aspx.

It was also reported that food waste was not recycled.

In addition to the recycled materials listed above, the Airport also minimized construction-related waste. COS implemented the following practices to reduce construction waste:

1. Suitable (clean) earthen fill material is stockpiled for future use, reducing the emissions associated with hauling off and on airport-property.

2. When possible, milled pavement is reused on future projects. This material is often stockpiled or placed on existing roads.

3. Used equipment is sold through surplus equipment auctions that allow airports with minimal budget to purchase usable equipment at a discounted price.

The survey also requested information regarding established recycling support infrastructure. As discussed previously, the Airport owns the recycling bins and maintains contracts for the recycling dumpsters. Recycling compactors, balers, scales, and hauling equipment are not in place.

In addition to recycling infrastructure, the Airport also reported that they collect and compost green/yard waste which is turned into mulch and used around the Airport. The quantity collected is unknown. Compost efforts occur on-site with no other infrastructure in place. Food waste is not composted; however, one tenant does donate leftover food.

The ACRP survey also assessed the Airport's waste disposal process. COS provides garbage cans for waste collection; garbage dumpsters, trash compacters, and hauling equipment are provided via contract to the Airport. **Figure 1-2**, **Figure 1-3**, and **Figure 1-4** illustrate the existing recycling and waste equipment. Waste is disposed of at one of two landfills in El Paso County:

1. Colorado Springs Landfill—located at 1010 North Blaney Road, Colorado Springs, CO

2. Fountain Landfill—located at 10000 Squirrel Creek Road, Fountain, CO

All waste reported is for airport-operated spaces. Terminal tenants are billed monthly for waste, while concession and general aviation tenants manage waste from their leased areas. Terminal tenants are provided access to the trash compactors and recycling roll offs located on the east ramp and west docking area. Concession tenants have a waste container as well as a used grease waste container; both of which they are responsible for.

The following provides a brief summary of additional recycling practices employed by airport tenants:

Figure 0-2: Trash and Recycling Cans

Source: COS

Figure 0-3: Recycling Dumpsters

Source: COS

Airport Waste Management

Figure 0-4: Trash Compactors

Source: COS

- Airlines manage their own waste with some participating in a recycling program.

- Food and beverage tenants participates in an excess food donation program; reducing the overall amount of waste generated.

- Other tenants such as rental car companies, fixed base operators, charter operations, etc., collect and recycle items such as batteries, oil, oil filters, and tires.

Operation and Maintenance (O&M) Requirements

The Airport has defined procedures outlined in their Standard Operating Procedure (SOP), "Environmental Guidelines and Standard Operating Procedure – Waste Management and Recycling." The purpose of the SOP is to reduce the potential for inappropriate waste disposal and stormwater pollution through proper waste handling and disposal practices. The practices include inspecting waste disposal areas, using proper waste disposal containers, and ensuring waste container lids are properly labeled and secured. The following bullets outline the procedures included in the SOP:

- Solid Waste: The Colorado Solid Waste regulations define solid waste as discarded material, including solid, liquid, semisolid, or contained gaseous material, resulting from industrial operations, commercial operations, or community activities. This category does not include solid or dissolved materials present in domestic sewage, agricultural wastes, irrigation return flows, or point-source industrial discharges (subject to permits under the provisions of the Colorado Water Quality Control Act. All non-hazardous solid waste can be disposed in the trash. The trash is removed by airport maintenance staff, placed in exterior dumpsters, and hauled to a local landfill via a contract with Waste Management.

- Hazardous Waste: Hazardous waste requires proper off-site disposal. This type of waste may include unused chemicals or specific chemical spills that are known to be hazardous as defined in the Colorado Hazardous Waste regulations. Airport employees are directed to contact the Airport Environmental Specialist if hazardous waste requires disposal.

- Universal Waste: Universal waste can be recycled instead of being managed as a hazardous waste. Universal waste includes electronic waste (electronic devices and components), mercury-containing lighting (fluorescent lamps) and devices (thermostats), used batteries, aerosol cans containing hazardous waste, and specific pesticides. Universal waste receptacles for recycling are located in the double-doored ramp-level offices between gates 5 and 7. The Airport contracts Waste Management to remove these materials.

- Special Waste: An example of special waste is used absorbent from spills usually considered non-hazardous. Special waste is typically disposed in a landfill after the completion and approval of a waste profile via waste management. Containers with special waste, including empty drums, must be properly labeled. Airport employees are directed to contact the Airport Environmental Specialist for profile approval and waste manifests. The Airport Environmental Specialist must make arrangements for the removal of special waste.

- Recyclable Materials: The Airport offers a single-stream recycling program. Recyclables should not be kept in plastic bags as the bags can become entangled in the recycling equipment. Also, the following trash items must be kept out of recycling bins to avoid contamination: food waste, foam containers, and used paper products (plates, cups, paper towels, etc.). Recyclable materials placed in the blue recycling containers (located in the passenger areas) or in the blue recycling bins (in offices, break rooms, etc.) need to be disposed of in the green recycling dumpsters. These dumpsters are located on the west ramp north of gate 3 and along the concrete wall on the west loading dock area. Recyclables are removed from the Airport via a contract with the Waste Management.

Per the Airport's SOP, waste logs and manifests are to be kept by the facilities manager and the environmental specialist. The Airport does not currently produce an internal report for airport employees nor is an external report produced for the website or press releases. It may be beneficial to release the waste logs internally to keep interest in the program and advertise a positive program.

Review of Waste Management Contracts

Current Contracts

As discussed, the Airport, as part of the City of Colorado Springs, is contracted with Waste Management for removal of solid waste and recycling materials. The waste and recyclable materials are collected from the Airport by airport maintenance staff and placed in exterior dumpsters. Waste Management then removes the waste and recyclables and transports them to landfill or recycling facilities. Terminal tenants are billed monthly for waste removal, while concession and general aviation tenants manage their own waste.

Purchasing

The City of Colorado Springs' Environmentally Preferred Purchasing (EPP) Policy directs the Airport to, when possible, buy more environmentally preferable goods and services. As stated in the Policy, "the City recognizes the value in evaluating the price, performance, availability, as well as environmental impacts of goods and services procured by the City. The City recognizes the opportunity to minimize long-term costs to the City through procuring sustainable goods and services with longer life cycles." The EPP requests that environmentally preferable goods and services only be purchased if they meet performance

needs, are available within a reasonable time period, and can be purchased at a reasonable cost.

All City departments that purchase goods or services, or contract for goods and services, are required to utilize the EPP in their purchasing decisions and encourage contracting vendors to do the same.

The objectives of the EPP Policy include the following:

- Minimize long-term costs to the City through procuring sustainable goods and services with longer life cycles
- Conservation of natural resources - by reducing water and energy use
- Reduction of materials sent to the landfill
- Minimization of pollution and waste - such as packaging materials and waste generated by use of the product or service
- Enhance availability of sustainable products within the City of Colorado Springs
- Utilization of high-performing, efficient, superior-designed products which are less harmful to the environment and our city
- Education of our employees and vendors on sustainable purchasing and materials management
- Maximization of recycling, reuse, and repurposing of materials
- Maximization of biobased content of products
- Introduction of products that are designed with the environment in mind
- Reduction in greenhouse gas emissions
- Reduction of toxins and hazardous materials

City vendors and contractors are encouraged to purchase products that are listed on the General Services Administration's Green Procurement Compilation (GPC). According to the EPP, "these products have been verified as part of green procurement and include products and services with credible certifications, or that have utilized tools or programs." The EPP provides additional guidance on purchasing items and services such as green building materials, office supplies, furniture, electronics, appliances, lighting, cleaning products, energy and water saving equipment, and landscaping.

Lastly, the EPP Policy encourages each department to evaluate the environmental impacts of each Response for Proposal in addition to the standard criteria of price, performance, and availability. It is encouraged that vendors follow the EPP Policy and indicate the sustainability specifications of their products and services.

Leases and Service Contracts

The Airport has numerous tenant leases as well as service and goods contracts. The agreements vary in duration and expire intermittently. Recycling, reuse, waste reduction, and environmentally preferred purchasing incentives are not included in existing contracts.

Funding

Expenses associated with waste management, to include the collection and disposal of solid waste and recyclables, are paid for by the Airport from the facilities operating budget. The management of tenant produced waste is the responsibility of tenants.

Potential for Cost Savings or Revenue Generation

The Airport contracts with Waste Management to rent the recycling and trash dumpsters. The following fees are related to the Waste Management contract:

- $22,426 annually for waste going to a landfill
  - Compactor east side of concourse $1,147.16/month
  - Compactor west side of concourse $573.58/month
  - Dumpster at field shop (6 yard) $148.06/month
- $2,800 annually for recycling
  - Recycle dumpster air at air cargo (3 yard) $45.01/month
  - Recycle dumpster at terminal (4 yard) $106.61/month
  - Recycle dumpster at terminal (8 yard) $81.73/month

These costs include container rental and service, scheduled material pickup, transfer to disposal site/recycler, and educational programs. As shown, the largest waste management expense is the annual cost for waste transported to a landfill. This cost can only be reduced by decreasing the amount of waste which goes into the landfill stream. The following section provides recommendations to minimize waste generation.

Minimize Solid Waste Generation

As the amount of recyclable material and waste increases, the costs associated with removal will also increase. To reduce costs, the amount of waste generated needs to be reduced. The Airport may consider the following condensed strategies to reduce waste and the associated removal costs.

1. Complete an initial comprehensive waste audit to fully understand where the most waste is being generated. This audit would inform a trackable baseline that can be used to develop future reduction plans.

2. Once a baseline is established, track annual volume of waste going to a landfill and the amount diverted through recycling, reuse, reduction, or donation.

3. Actively discuss baseline volume and future goals with waste generators. Initial reductions may occur through more transparency and awareness of is the waste being generated.

4. Discuss goals with Waste Management and other waste removal contractors to see if rebates or incentives are available.

5. Evaluate regular purchasing decisions and products to ensure the EPP is being considered. The Airport should actively encourage vendors and contractors to do the same—possibly including language in contracts requesting verification that the EPP was considered.

6. As new leases are signed or old leases renewed, the Airport could incentivize waste reduction (i.e., decreased rates if waste remains under a set threshold, additional fees if waste exceeds the rate, and requirements to participate in a recycling program).

7. Enhance the existing recycling program through additional receptables, signage, additional training and education outreach, and regular communication with airport staff regarding the success of the program.

8. Complete a cost-benefit analysis for adding recycling infrastructure such as trash balers, scales, and airport-owned dumpsters and compactors.

The strategies above would facilitate the Airport's commitment to become more sustainable. Ultimately, support and buy-in from airport administration and employees will have the most impactful influence on the success of the Airport's recycling, reuse, and waste reduction.

Recycling Feasibility

The extent of recycling that occurs at COS is limited, as the Airport is the most active participant in a recycling program. This limited reach stems from the Airport's partial control over leased areas and a lack of tenant buy-in on recycling programs. As discussed previously, the current recycling program is being updated to encourage more participation and support.

The City of Colorado Springs, and therefore the Airport, is committed to continue the current recycling program and improve waste reduction and participation in recycling programs. The incentive to change the current strategy is to ultimately reduce operating costs and move the Airport towards greater sustainability. A commitment to purchase additional waste collection infrastructure would also advance the Airport's recycling program. Additionally, COS can encourage more tenants to recycle by emphasizing participation in revised leasing contracts or by creating incentives that promote involvement.

The Airport is also committed to adhering to state and federal waste management regulations. The Colorado Department of Public Health and

Environment (CDPHE) provides numerous requirements for the generation and disposal of solid and hazardous waste. Division 1007 provides requirements related to hazardous materials and waste management. Lastly, the Code of Federal Regulations, Title 49 for Transportation, governs the domestic transportation of hazardous materials for all forms of transportation to, from, and within the United States.

2. Environmental Resiliency

The frequency of extreme weather events is increasing across the nation and the state of Colorado is no exception. The recent fires, floods, severe thunderstorms and hail, and drought have made the City of Colorado Spring and the Airport acutely aware of the need for proactive strategies. These extreme weather events heavily impact the aviation industry as a whole— potentially putting entire airport and airline operations at a standstill.

Resiliency and Sustainability

"The ability of communities to rebound, positively adapt to, or thrive amidst changing conditions or challenges—including human-caused and natural disasters—and to maintain quality of life, healthy growth, durable systems, economic vitality, and conservation of resources for present and future generations."

Source: Colorado House Bill 18-1394

Historically, airports are accustomed to change and have numerous standard operating procedures in place to best address this dynamic environment. This environment includes environmental challenges that COS is accustomed to, especially in the snowy winter months. However, as our climate changes the severity of these environmental challenges has escalated.

To raise awareness and inform preparedness efforts, the following sections provide a brief discussion of the environmental threats occurring near Colorado Springs, how they impact the Airport, and what the Airport can do to be best prepared while minimizing its impact to our changing climate. The 2020 Hazard Mitigation plan for Colorado Springs categorized the Airport as a critical facility. Critical facilities are considered essential to the health and welfare of the population and become especially important after a hazard event. In the near future, airlines and aviation tenants will be forced to prioritize the physical, technological, and cultural infrastructures of airports when choosing operational locations; and those airports that proactively address climate resilience will be most successful.

It should be noted that airport resiliency includes a multitude of challenges, many of which are unrelated to the natural environment. This Master Plan discusses resiliency in terms of the natural environment; however, it would be worthwhile for future resiliency discussions to be holistic and address a broader scope that includes risks such as pilot strikes, air traffic control (ATC) strikes, fuel/energy crises, national security incidents (like September 11, 2001) and their aftermath, recessions, and COVID-19 and other medical crises.

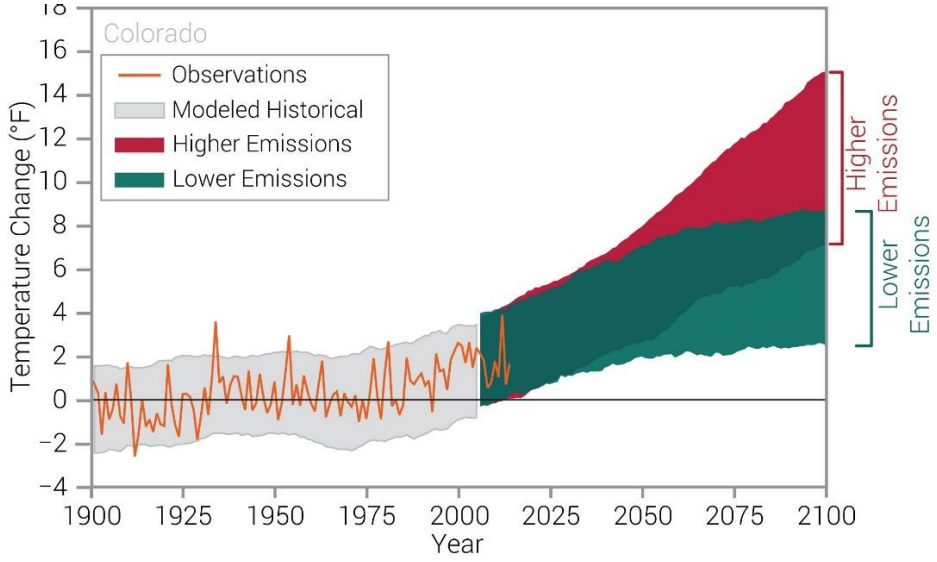
Local Climate

Temperature

A technical report (published by the National Oceanic and Atmospheric Administration's [NOAA] National Centers for Environmental Information [NCEI]) in the 2017 Colorado State Climate Summary attributed the state's variable climate to the inland location and varied topography. Colorado Springs sits next to the Rocky Mountains and in the southcentral part of the state.

The Technical Report states, "average annual temperatures for Colorado have remained consistently higher than the long-term average (1895–2015) over the past two decades (see **Figure 2-1**). Since 2000, the state has experienced the highest average spring and summer temperatures on record. The hottest year on record was 2012. In addition to the overall trend of higher average temperatures, the state has experienced an above average number of very hot days (days with a maximum temperature exceeding 95°F) and a decrease in the number of very cold nights (nights with a minimum temperature below 0°F) since 1990. Colorado rarely experiences warm nights (days with a minimum temperature exceeding 70°F) due to its high elevation and generally dry climate. The greatest number of warm nights occurred in the 1930s; however, the state, along with other parts of the United States, has seen an above average number in recent years."

Figure 2-1 - Observed and Projected Temperature Change for Colorado



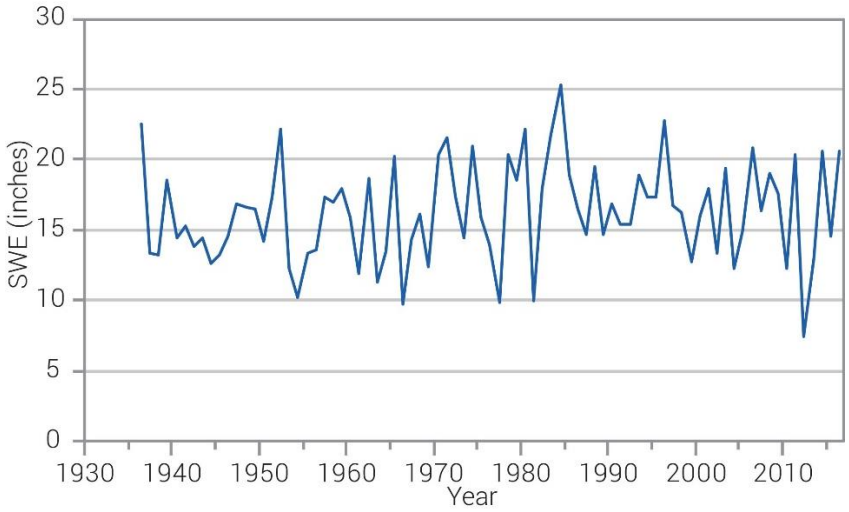
Source: CICS-NC and NOAA NCEI

Precipitation

Annual precipitation for the State of Colorado is 17 inches and has ranged from a low of 11.85 inches in 2002 to a high of 25.52 inches in 1941. Colorado Springs typically receives an average of 15-16 inches of precipitation, with most of the moisture coming from rains between April and August. The 1930s was the state's driest decade and only averaged approximately 12 inches of precipitation. The wettest decade occurred in the 1990's averaging approximately 19 inches of precipitation.

Headwaters are the initial sources of bodies of water, and Colorado is a headwater state. The sources of the Colorado, Rio Grande, Arkansas, and Platte Rivers are found in Colorado. Consequently, any changes in aggregate precipitation impact areas larger than the state itself. Because annual snowpack depths directly contribute to snowmelt levels, variations can result in limited water in low years and flooding in high years (when combined with spring rains). According to the USDA National Resource Conservation Service, snow water equivalent (SWE) is the amount of water contained within the snowpack and is highly variable from year to year with no long-term trend. The variation of SWE at Berthoud Pass, Colorado, a snow course site, is shown in **Figure 2-2.**

Figure 2-2 - Snow Water Equivalent at Berthoud Pass, CO



Source: USDA National Resources Conservation Service

Thunderstorms are common events in Colorado, with the more intense storms bringing large damaging hail and flash floods. Colorado Springs experiences numerous hail events of varying intensity each summer. Hailstorms in 2018 were especially destructive, with hail measuring up to 4 inches, and caused devastating damage to the area. Heavy storms such as these also result in flash floods causing road closures and infrastructure damage.

Winter storms are also a common occurrence in the state and include heavy snow, ice, and blizzard conditions. These conditions can paralyze a region: stranding travelers, blocking delivery and supply lines, and disrupting emergency and medical services. Heavy ice can collapse trees, electrical wires, telephone poles and lines, and communication towers resulting in wide-spread and lengthy power outages. The bomb cyclone of 2019 forced the closure of all major highways outside of the Denver area, including Interstate 25 to Colorado Springs. KOAA News, a local news station estimated that 1,500 motorists were left stranded in El Paso County alone, requiring more than 100 National Guard rescue operations. It is also reported that, at one time, 445,000 customers were without power.

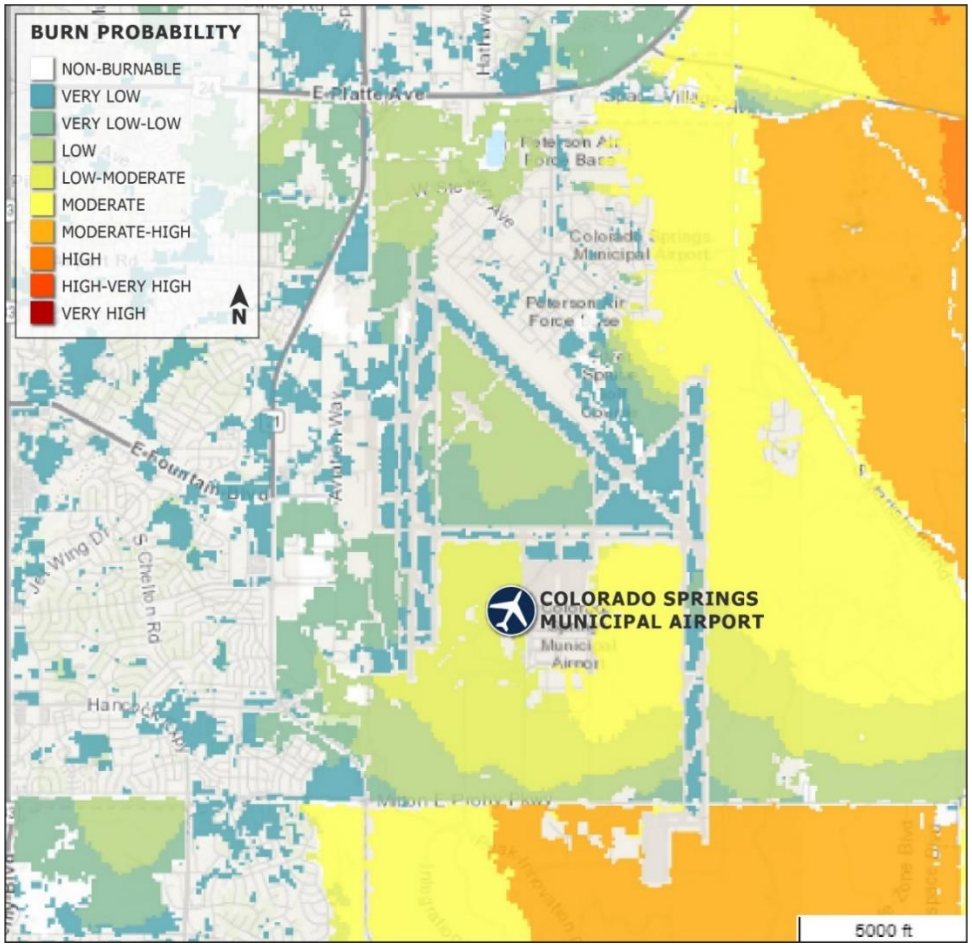
Drought/Wildfires

Conversely, the state also experiences times of severe drought, putting much of the region at risk of wildfire. It is projected that these periods of little precipitation and drought will last longer and become more severe. According to the NOAA Technical Report, in 2012, Colorado experienced one of the worst droughts and wildfire seasons. That year the High Park and Waldo Canyon Fires burned more than 85,000 acres. The Waldo Canyon fire started approximately four miles northwest of Colorado Springs and burned more than 18,000 acres, destroyed 347 homes, and resulted in insurance costs totaling $453.7 million. The following year, in 2013, the area was hit with the devastating Black Forest Fire. This fire burned an estimated 14,280 acres, destroyed 489 homes, and killed two residents while in an attempt to evacuate. Most recently, the 2021 Marshall Fire burned 6,000 acres and destroyed approximately 900 homes in Louisville, Superior, and unincorporated Boulder County.

Forest fires such as the Waldo Canyon fire not only destroy homes and infrastructure, but they also leave baren soil that is unable to naturally manage floods from snow runoff and rainstorms.

According to the Colorado State Forest Service, portions of COS are considered moderate risk for fire, while area to the south and east of the Airport are considered moderate to high risk of fire. **Figure 2-3** shows fire risk in relation to the Airport.

Figure 2-3: Fire Risk Map Near COS



Source: Colorado State Forest Service, Colorado Wildfire Risk Public Viewer, Accessed 11/20/2021

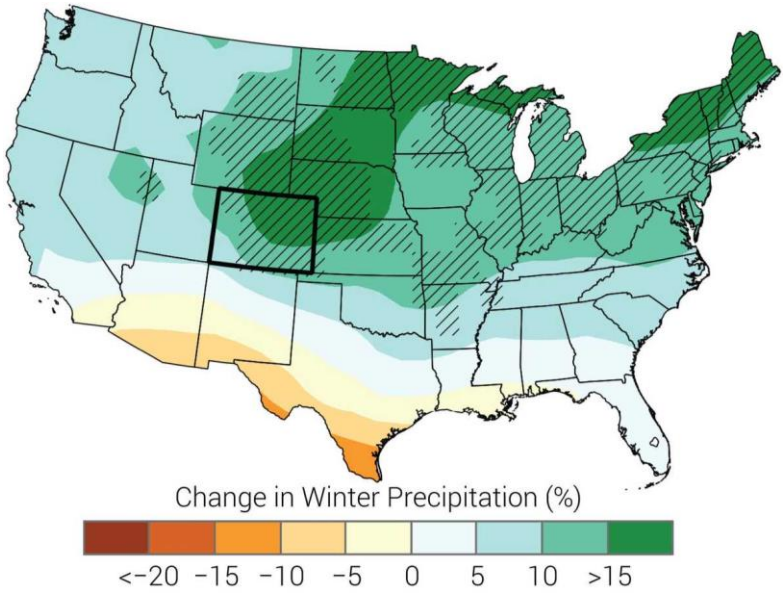
Climate Projections

Projected greenhouse gas emission models show varying degrees of warming, with the higher emission levels resulting in historically unprecedented warming and lower emissions producing only slightly warmer than historical records. **Figure 2-1** shows the varying projections and resulting temperature increases.

Similar projections, although uncertain, forecast increased precipitation in the winter and decreases in the summer (see **Figure 2-4**). As discussed, a heavier winter and increased snowpack would benefit the state and the regions that rely on the area as a water source; however, rising temperatures increase the lowest elevation at which snow falls. This results in more precipitation falling as rain that quickly evaporates instead of being stored as snowpack. It is also projected that extreme precipitation events could increase.

Drought severity is also projected to increase, as dryer summer months impact precipitation patterns that reduce agricultural and metropolitan water supplies. The increased droughts also result in a higher risk of wildfire rate and severity.

Figure 2-4 - Projected Change in Winter Precipitation



Source: CICS-NC, NOAA NCEI, and NEMAC.

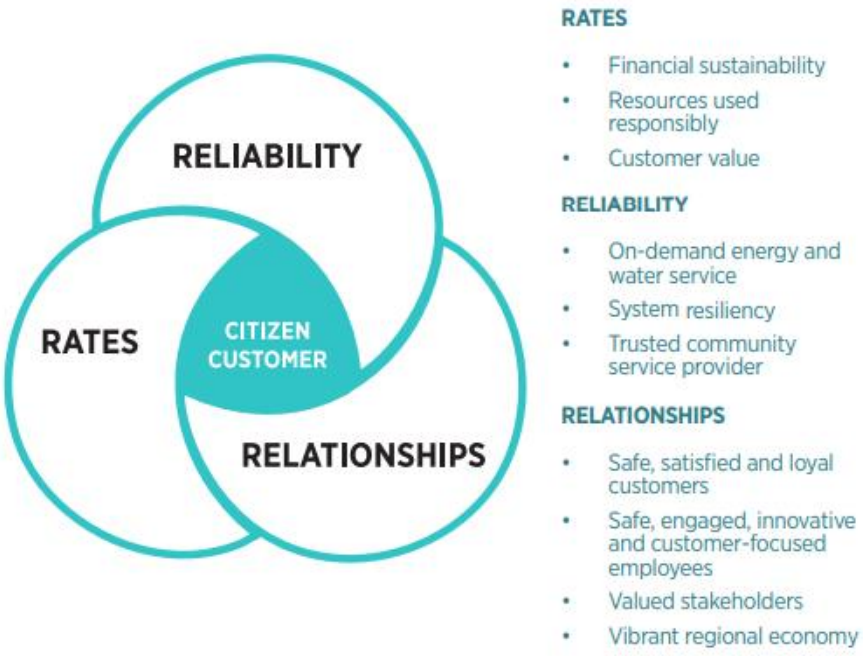
Energy Resiliency

Energy resilience ensures an entity has both a reliable, steady supply of energy, and contingency measures in place in the event of a power failure. As discussed previously, many of the natural weather events that commonly occur in Colorado—snow, wind, thunderstorms, and fire—result in power outages. These are real and common events likely impact the Airport on an annual basis and, if projections hold true, increase in severity and frequency.

Utility Providers

Utilities, including electric, natural gas, water, and wastewater services, are provided to the Airport by Colorado Springs Utilities (CSU. CSU is a community-owned, not-for-profit enterprise that provides utilities to the City of Colorado Springs). The vision and strategic direction of CSU are defined in the 2020 Strategic Plan: to "prepare, adapt and respond to industry changes to create the best possible value for citizens and customers." Their strategic focus specifically calls out their desire to provide system resiliency as shown in **Figure 2-5**.

Figure 2-5 - CSU Strategic Focus



Source: CSU 2020 Strategic Plan

Furthermore, a strength, weakness, opportunity, and threat (SWOT) analysis was included in the CSU Strategic Plan. The SWOT provides insight to the enterprise's resiliency—**Figure 2-6** summarizes these strengths, weaknesses, opportunities, and threats. As shown, the strengths and opportunities outnumber the weaknesses and threats, providing an optimistic outlook for CSU's ability to be resilient in the future and provide utilities to the Airport in the face of any adverse environmental event.

Figure 2-6 - SWOT Results (Resiliency Related)

Strengths	Opportunities
– Long-range energy and water supply capacity – Long-range planning initiatives and programs – Financial health – Emergency preparedness for business continuity and disaster recovery – Diverse generation portfolio	– Collaborating on regional water and energy projects – Implementing new energy solutions – Improving infrastructure resiliency – Assisting with military resiliency initiatives – Adapting to population growth – Improving cross-service coordination and efficiencies
Weaknesses	**Threats**
– Aging infrastructure – Fragmented and undocumented processed – Inability to react quickly	– Fuel price volatility – Weather variability – Water supply uncertainty – Population growth unpredictability

Source: CSU Strategic Plan

Energy Use Reduction

The Airport can reduce consumption of electricity and natural gas. Decreased consumption would not only lower the burden on CSU and reduce operating costs, but also diminish the Airport's overall carbon footprint and reliance on greenhouse gas emitting utilities.

With the help of CSU, the Airport completed energy audits in 2012 and 2020 that provided reduction strategies and before and after comparisons of energy use. The following changes were made between 2017 and 2019, accounting for the reduction in energy usage:

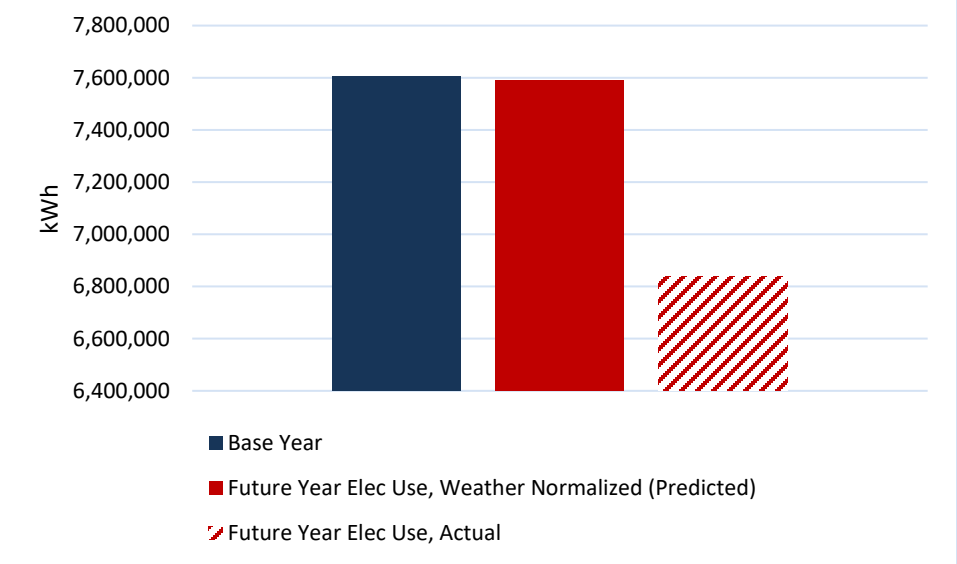
- One of the chillers was replaced with a variable speed mag-lev unit, 500 tons. This new unit is slightly larger than the 480-ton unit it replaced. It was installed in 2018 and started in early 2019. Notably, it was able to carry the cooling load by itself in summer of 2019, where it took two chillers before. This design is well known for excellent part load performance supplied by the variable speed compressor and low parasitic bearing loss.

- Approximately 40 ramp lights near aircraft parking were replaced with 300W LED lights. They were previously 1000W metal halide lamps.

- The lighting on Milton Proby roadway was replaced with 100W LED lights—previously 400W metal halide lamps.

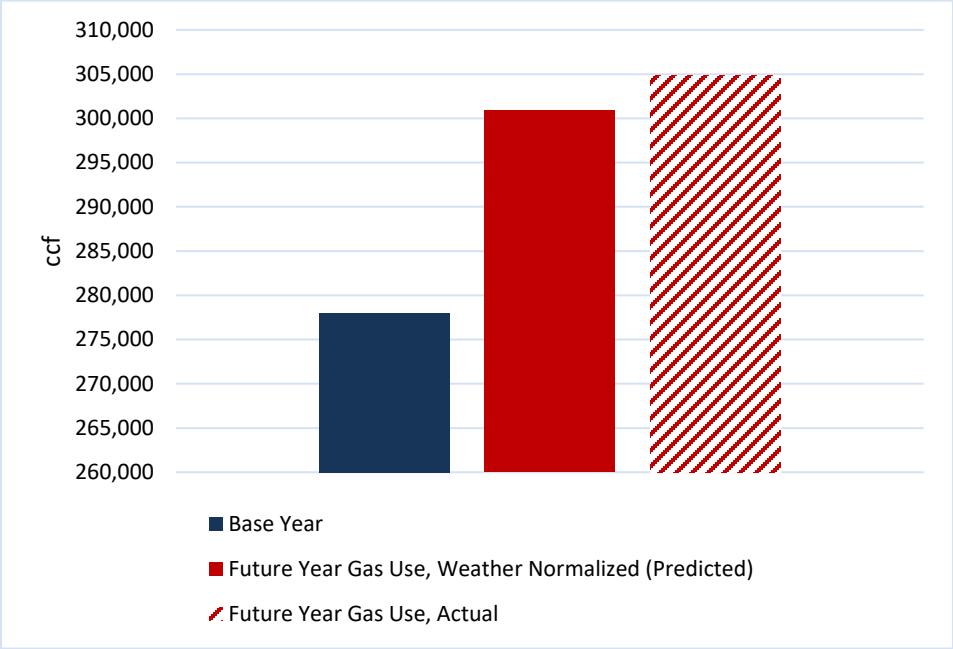
While the 2012 audit did not provide baseline gas and electric usage data, the 2020 audit did. **Figure 2-7** shows the reduction in electricity usage between 2017 and 2019, with the implementation of energy management strategies. **Figure 2-8** shows an increase in gas consumption over the same period.

Figure 2-7: Elec Use, Base Year (2017) vs. Future Year (2019)



Source: COS 2020 Energy Audit

Figure 2-8: Gas Use, Base Year (2017) vs. Future Year (2019)



Source: COS 2020 Energy Audit

The Energy Audit also provided energy management recommendations for the Airport to consider in the future. These recommendations were prefaced by guidance to first squeeze the most efficiency out of the existing systems before adding new technology. This recommendation reiterated that the consideration of new equipment is the last step in energy management. With that being said, new technologies to consider included those listed in **Table 2-1**.

Table 2-1: 2020 Energy Management Recommendations

Level of Investment	Recommendation
Low Cost	Consumptive Use Adjustment for Cooling Tower
Low Cost	Eliminate Unintentional Overlapping Mechanical Heating and Cooling
Low Cost	Interlock Baggage Tug Area Make Up with Exhaust
Low Cost	Occupancy or CO2 Control of Ventilation
Low Cost	Optimization Routines, Predictive Maintenance, Demand Limiting Control
Capital	Consider Options for Reheating in Summer – Install Jockey Boiler – Install Heat Recovery Chiller
Capital	Power Factor Correction
Capital	Synchronous (No Slip) Fan Drive Belts

Additional details supporting these recommendations can be found in the 2020 Audit.
Source: 2020 COS Energy Audit

Energy Resiliency

The Airport itself has emergency plans in place for utility outages that result from extreme weather. CSU is the sole provider of power, with no secondary providers in place. The following contingency plans are outlined in the Airport Emergency Plan:

1. All aircraft movement area lighting can be run on a back-up power generator. The generator is diesel operated and can hold up to 500 gallons of fuel.

2. FAA approach lighting systems are maintained by the FAA with a battery backup system.

3. A list of suppliers for items such as water, snacks, and blankets are maintained with the Airport operations and maintenance staff.

The emergency plan does not include specific contingency plans for power outages in an occupied area.

In addition to the contingency plans, the Airport has installed a solar covered carport and offers electric vehicle charging stations (EVCS). As of October 2021, the solar carport had generated 121.1 MWh of power. This equates to approximately 405,065.09 lb's of CO2 emission saved and equally as important provides an alternate power source for the Airport. The EVCS were installed in 2020; however, due to the COVID-19 pandemic, they were not open to the public until March 2022. There is limited usage data at the time this document was prepared; however, the data that is available shows a steady increase in usage. The EVCS support the industry's integration of electric powered vehicles and provides an alternate power source for surface traffic.

With resiliency in mind, future development and renovations should include design elements that offer contingency plans for utility outages. These elements may include passive building design that allows thermal comfort and natural daylight. Future designs should also include requirements that climate-controlled spaces incorporate back-up power or thermal control.

COS may also consider the addition of Airport-managed renewable energy sources. Although renewables are not capable of running the Airport on a daily basis, they can supplement what is being purchased from CSU and offer a backup in the event that CSU is unable to provide energy for a length of time. Renewable energy options are listed below:

- Solar: The Airport has numerous large open fields of mowed grass throughout the property, specifically south of the terminal building and parking areas. These areas can't be developed due to airspace constraints and would be an ideal location for a ground-mounted tracking photovoltaic (PV) array, potentially with low-maintenance native plantings under the array. Native plantings absorb water, provide pollinator habitat, and keep the ground temperature cool under a PV array. A PV field with native prairie plantings offers cost savings, reduced carbon emissions, and a highly visible STEM learning environment. The Airport has also considered installing PV arrays on covered parking; this option may occur in the future.

- Electric Vehicle Charging Stations: The Airport may consider supporting electric vehicles by retrofitting parking locations to accommodate electric vehicles with pay-as-you-go or sponsored public charging stations. The

Airport may also look for partners to bring free, subsidized, electric charging stations to the Airport.

- Wind: The Airport is not an ideal location for commercial-scale wind turbines due to required proximity to the runways and airspace constraints. Small, building-integrated, or demonstration-scale wind turbines could be a viable source of on-site renewable energy so long as they are life-cycle cost effective and are guaranteed not to cause frequency/signal /noise interference to the radar, testing, and remote sensing equipment used at the Airport.

Renewable energy sources can be a creative way to supplement traditional energy and potentially offer a contingency plan for utility outages; however, each proposed recommendation should go through a life-cycle cost analysis to ensure the initial investment provides adequate return.

Water Resiliency

The Airport is located in the Fountain Creek Watershed, which extends more than 900 square miles in southern Colorado. Sporadic and widely distributed precipitation in this region has caused flooding and sediment deposit in Fountain Creek and its tributaries, degrading this vital watershed. The Airport is located near the Denver Basin Aquifer; this aquifer is comprised of four smaller aquifers: the Dawson, Denver, Arapahoe and Laramie-Fox Hills. The Denver Basin Aquifer is used primarily for municipal, domestic, commercial, and agricultural purposes.

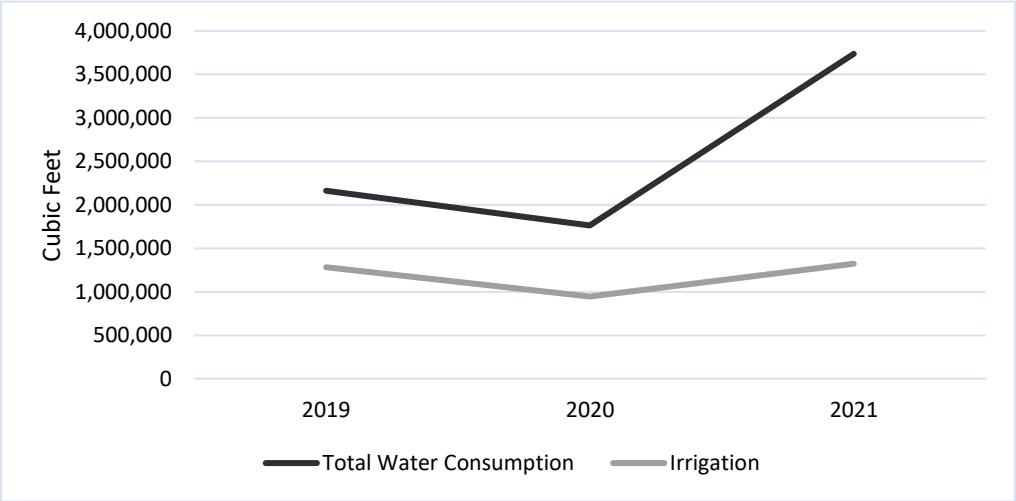
According to the City of Colorado Springs Stormwater Enterprise, nearly 80 percent of the area's water comes from the Western Slope of the Rocky Mountains, nearly 200 miles from Colorado Springs. CSU supplies water utilities to the Airport.

Although drought and groundwater pollution are real risks, water scarcity is an equally valid concern. Though this concern has become a national issue, it is a specific concern to the State of Colorado and the Colorado Springs area. Water availability is predicted to be a top concern, especially if projections showing increased temperatures and decreased snowpack hold true. To preempt potential shortages, water conversation strategies should be employed. It is also important that the water quality is maintained (or improved) to ensure available water is usable.

Airport Consumption

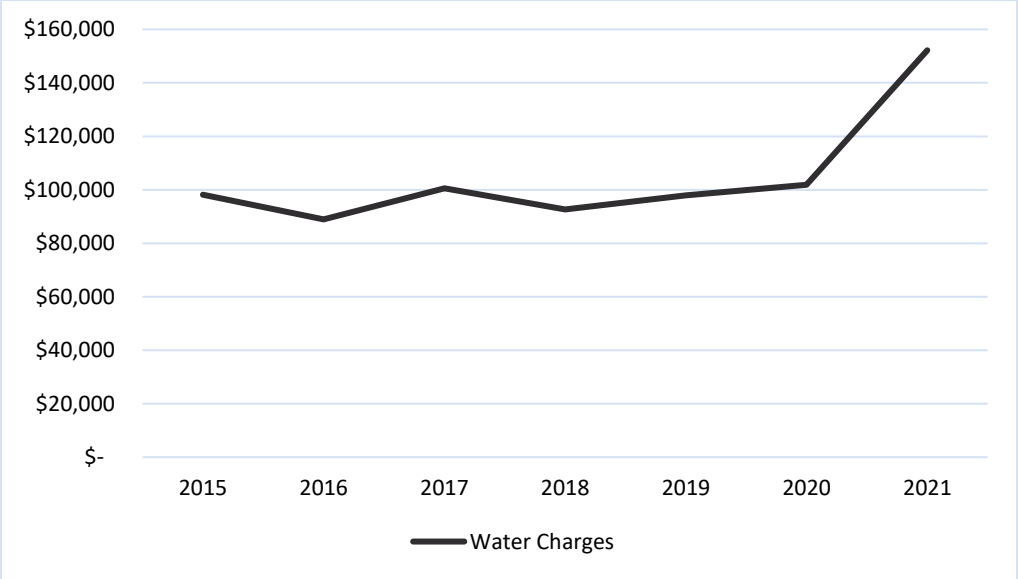
In 2020, the Airport consumed approximately 3.7 million cubic feet of water, an increase from previous years (see **Figure 2-9**). This increase is largely attributed to greater irrigation usage from the new business park. The cost associated with this consumption is also significant—as shown in **Figure 2-10**. Water consumption increased by nearly 55 percent between 2015 and 2021; though some cost increase is more closely related to rate increases. Water conservation measures would not only further regional water reduction efforts but also noticeably impact the Airport's bottom line.

Figure 2-9: Water Consumption Amounts



Source: COS

Figure 2-10: Water Consumption Charges



Source: Colorado Springs Airport

Water Use Reduction

To improve resiliency, the Airport should reduce reliance on large quantities of water provided by CSU. In doing so, the Airport could operate on less during an emergency or, if water becomes restricted/scarce, slow the consumption of water from sources that aren't recharging.

Strategies the Airport could consider include those listed below:

- Complete a water use audit to establish a baseline of water use and potentially add automated metering to better track consumption. It is noted

that the Airport may have the opportunity to participate in an irrigation audit with CSU in the near future.

- Analyze areas that consume the most water and develop a plan for reduction.
- Regularly inspect and fix leaks on all pipes, appliances, and equipment.
- Ensure existing infrastructure is operating at maximum efficiency; keep parts and equipment up-to-date and upgrade systems as needed. Note that the Airport has worked with a CSU water conservation specialist to replace pre-rinse spray valves with more efficient valves.
- Ensure all new development is designed to reduce water consumption. Include specific language in new leases that address water consumption.
- Regularly train existing and new employees on the importance of water use reduction and how they can contribute to the overall effort. Employees should also be adequately trained on all equipment to understand if it is operating efficiently.
- Reuse water for non-potable uses such as dust control, pavement washing, and plant/tree irrigation.
- Replace water-intensive landscape features with xeriscaping landscape.

Of the recommendations given, the most significant element to water conservation is employee, passenger, and administration buy-in and support. Like a recycling plan, successful programs are, generally, those that receive more support; goals and milestones should be celebrated and communicated to help gain and retain support.

Water Resiliency

Water resiliency is an entity's ability to continually provide safe drinking water and properly treated wastewater during and after an emergency. As discussed, water scarcity and potential limitations are a reality for Colorado Springs. The Airport can best be prepared for periods of low availability by considering the following recommendations:

- Develop an emergency response plan in the event water from CSU is unavailable or contaminated. This plan may include on-site storage for both potable and non-potable water.
- Modify water infrastructure in anticipation of frequent severe storms, flooding, and drought, and water scarcity.
- Consider a wastewater treatment plant to reduce consumption from CSU and offer a backup if CSU is unable to provide water to the Airport.
- Monitor and test soils and water for contamination; take immediate action upon positive results to ensure water quality is protected.
- Consider flood risks to existing and future development; utilize pervious surfaces when possible.

Climate Resiliency

Climate resiliency can be defined as the ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to the changing climate.[2] As discussed, the climate of our nation, state, and the Colorado Springs area is changing. It is predicted that changes may include more severe storms at increased frequency, a rise in temperature, wide-spread drought, increased wildfire risks, and water scarcity.

Energy and water resiliency are discussed previously; this section provides concluding recommendations on how the Airport can best be prepared for other challenges presented by the changing climate.

General recommendations the Airport may consider to best withstand natural disasters include the following:

- Consider preparing a resilience management plan. This plan supplements the emergency management plan and focusses on advanced preparation for the changing climate.
- Buildings should be equipped with ample shelter-in-place locations for tornados and other natural disasters. Safe locations should be clearly marked, and employees made familiar with their locations. Mass notifications, able to reach all occupants both in and outside the buildings, is extremely important.
- The aggressive decarbonization goals placed on air traffic will lead to the replacement of fossil fuels with cleaner power sources. Infrastructure to support other forms of power should be considered as a demand arises.
- New buildings should be oriented such that regularly occupied areas can be daylit via north-facing glazing or windows to the south shaded against the summer sun. East and west facing glazing should be minimized to avoid heat gain.
- If practical, buildings should be programmed so that unoccupied areas face to the west and protect the occupied portion of the building from the prevailing winter wind. Occupied areas should generally be programmed to the north, east, and south.
- Consider adding emergency plans for wildfires to the Airport Emergency Plan. The existing discussion on fires is relevant to aircraft, fuel, and structural fires. The amount of grassland on and near the Airport increases the risk of fire. Wildfires are not only dangerous to those on the ground, at an airport, the inbound and outbound aircraft are also at increased risk of loss of visibility. This can ultimately hinder firefighting efforts that utilize aircraft.

[2] Center for Climate and Energy Solutions, https://www.c2es.org/content/climate-resilience-overview/, Accessed 2021

In conclusion, we cannot know what the climate will look like in the future. The projections vary and are largely dependent on the reduction of greenhouse gas emissions. The Airport must be proactive in reducing their carbon footprint while preparing for changes in our climate and the impacts to the aviation industry. Acknowledgment and openness, including the brief discussions such as those in this master plan, are a great start.

Colorado Springs Airport Master Plan

Regional Transportation Assessment

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1. Introduction

This report focuses on the regional transportation network that provides regional and local access to the Colorado Springs Municipal Airport (the Airport). The focus of this report is off-airport roads and facilities outside of the airport boundary. After the Introduction, the report is organized in four primary sections:

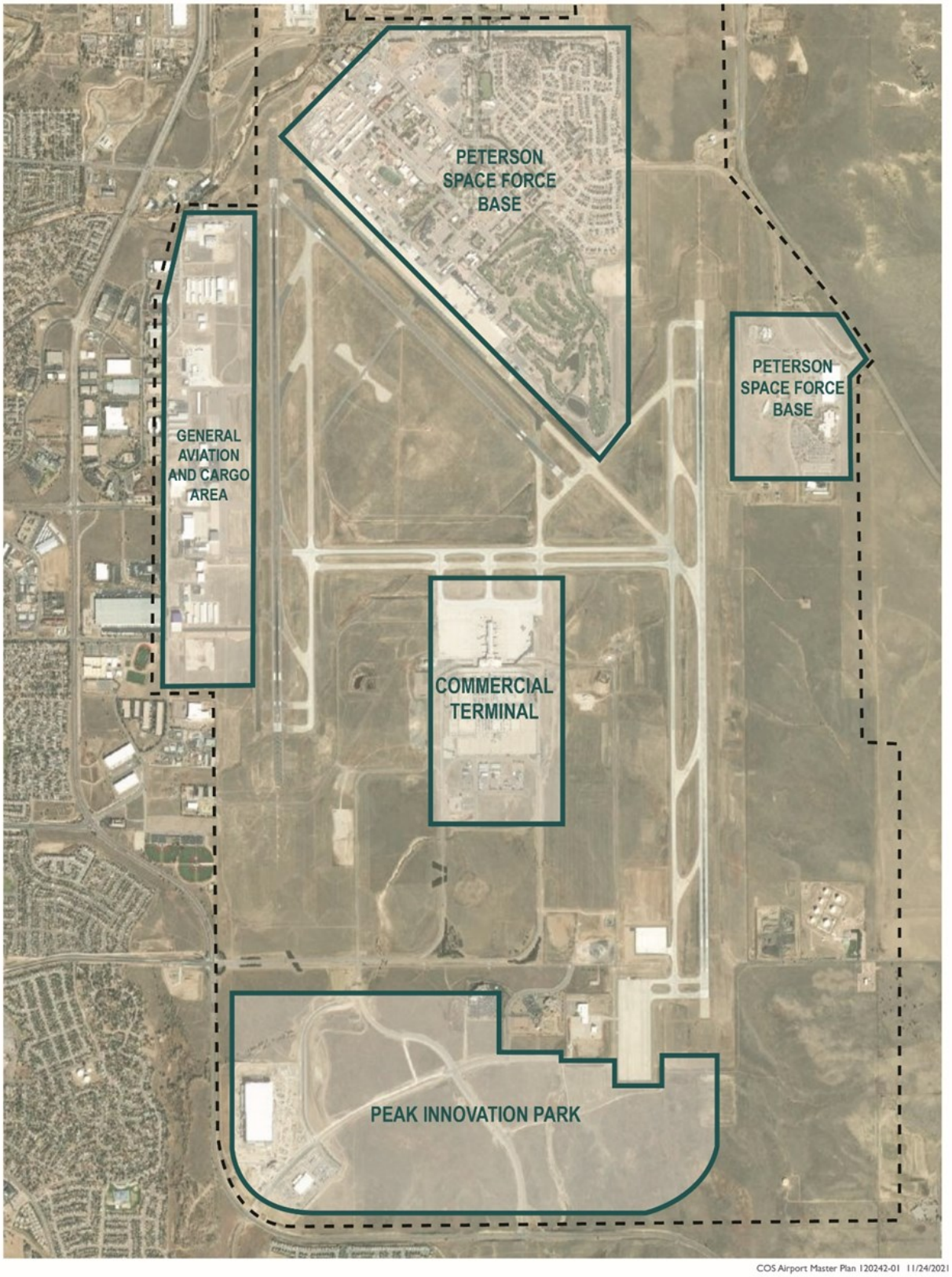
- ***Existing Surface Transportation Network***: Provides a summary of the existing regional roadway network, local roadways, public and private transit service, and the bicycle and pedestrian network.
- ***State of the Surface Transportation Network***: Provides an assessment of the existing and future operation of the transportation system.
- ***Relevant Plans and Studies***: Provides summaries of several previous or ongoing transportation plans and studies that are relevant to regional and local transportation to the Airport.
- ***Challenges and Issues***: Presents several key surface transportation challenges and issues, along with discussion of how they are currently being addressed and additional opportunities for improvements.

The Airport is municipally owned and operated by the City of Colorado Springs. It is in the southeast corner of the city and approximately 12 miles from downtown Colorado Springs. **Figure 1-1** shows the general location of operations on the airport property, including:

- Passenger Travel Terminal
- General Aviation and Cargo Area
- Peterson Space Force Base (SFB) on the north end
- The developing mixed-use Peak Innovation Park underway on the south end

The dotted line represents the Airport's property boundary.

Figure 1-1: General Layout of Colorado Springs Airport Property


PETERSON SPACE FORCE BASE
GENERAL AVIATION AND CARGO AREA
PETERSON SPACE FORCE BASE
COMMERCIAL TERMINAL
PEAK INNOVATION PARK
COS Airport Master Plan 120242-01 11/24/2021

2. Existing Surface Transportation Network

Surface transportation connections to the Airport are vehicle dependent. Routes vary for the different areas of airport operations, but all depend on the framework of the regional road network. Local roads provide access at various intersections. Alternative mode options, such as transit and active transportation, exist but are limited.

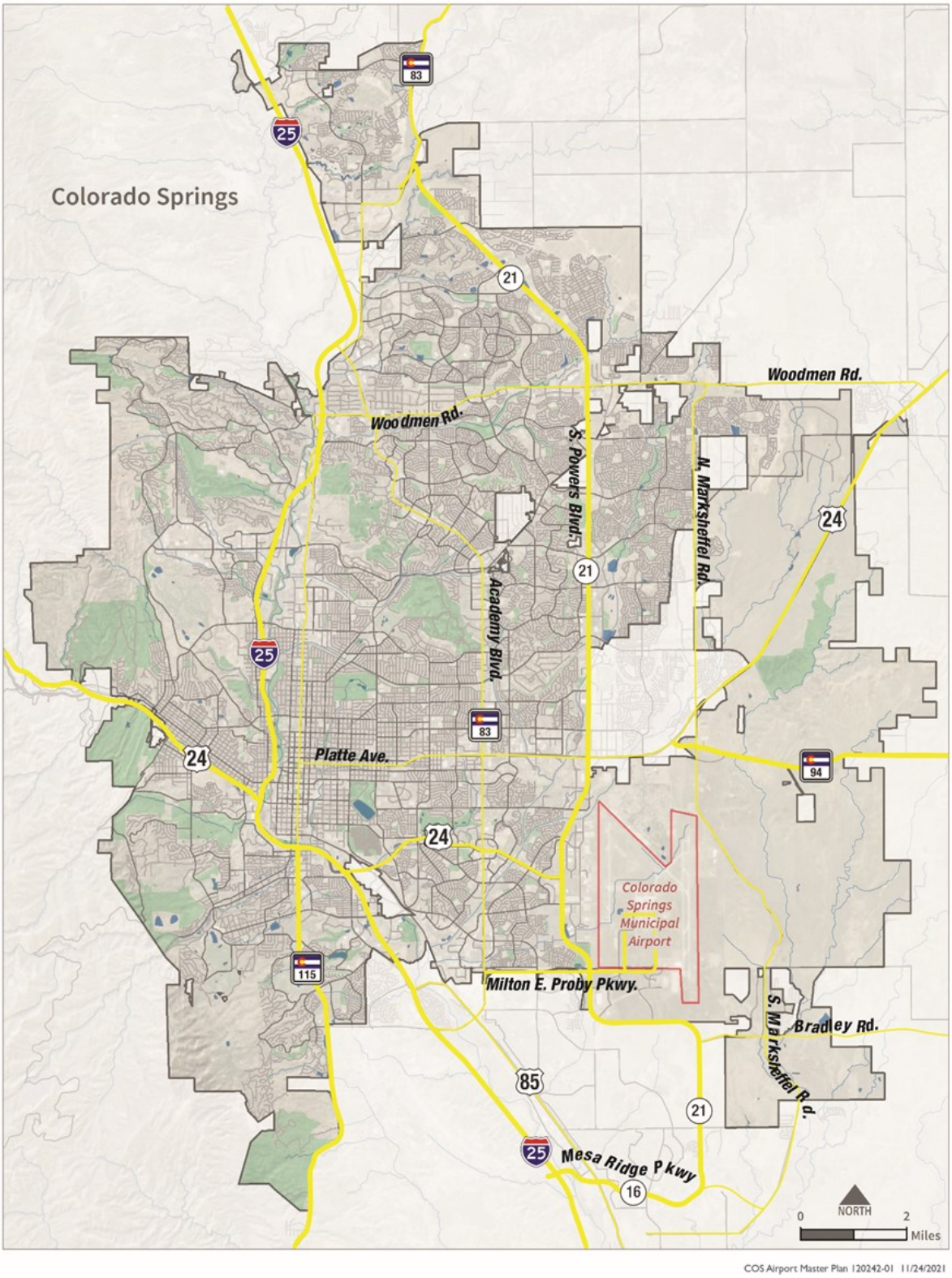
Regional Network

Regional access to the Airport is provided by Interstate (I)-25, US 24, and State Highways (SH) 21, 16, and 94. **Figure 2-1** shows the key regional roadways in the network. Average annual daily traffic (AADT) was obtained from the Colorado Department of Transportation (CDOT) Online Transportation Information System (OTIS) Traffic Data Explore webpage. [1]

- I-25 is the primary north-south interstate freeway through Colorado. CDOT has jurisdiction. The configuration of six lanes through most of Colorado Springs drops to four lanes south of the Lake Avenue (Ave)/S. Circle Drive (Dr) exit.
    - Exit 132 provides airport access via SH 16, which becomes SH 21 at Mesa Ridge Parkway. CDOT's OTIS reports 2020 AADT of 47,000 vehicles per day (vpd) north of Exit 128, 4 miles to the south.
    - Exit 135 provides airport access via SH 83 (S Academy Boulevard [Blvd]) and Milton E. Proby Parkway (Proby Pkwy). Year 2020 AADT was 77,000 vpd (north of the exit) and 57,000 vpd (south of the exit).
    - Exit 139 provides airport access via US 24 and Powers Blvd.
- US 24 is an east-west corridor connecting the Airport west to Woodland Park, Buena Vista, etc. and east to rural El Paso County towns such as Falcon, Peyton, Calhan, and Ramah. The road section of US 24 varies, along with its shared alignment:
    - US 24/Fountain Blvd (I-25 to Powers Blvd): Four-lane expressway, year 2020 AADT ranging from 24,000 to 42,000 vpd and truck traffic ranging from 6.3 to 7 percent.
    - US 24/Platte Ave (Powers Blvd to Marksheffel Rd): Four-lane expressway, year 2020 AADT ranges from 40,000 vpd at Powers Blvd to 33,000 at the intersection with SH 94. Truck traffic ranges from 5.9 to 7 percent.
    - US 24 (east of Marksheffel Rd): Four-lane principal arterial. AADT is 21,000 vpd east of SH 94, diminishing moving to the east.
- SH 21 (Powers Blvd) is a north-south corridor that currently operates as an expressway. A strategic corridor for the city, Powers Blvd is planned to eventually operate as a freeway with grade-separated interchanges. The north end will connect to I-25 near North Gate Blvd, and the south end connects to I-25 via SH 16 at the intersection with Mesa Ridge Pkwy. Powers Blvd is six lanes in both directions until south of E Fountain Blvd, where it is reduced to four lanes. Year 2020 AADT varies from 13,000 in the south (near Bradley Rd) to 37,000 on the north end (near Old Ranch Rd), with a high of 60,000 in the middle (near Galley Rd). Truck traffic ranges from 2.7 to 6.4 percent.

[1] CDOT OTIS Traffic Data Explorer. https://dtdapps.coloradodot.info/otis/trafficdata#ui/1/1/0/station/100958/criteria/025A/0/298.879/true/true/. Accessed 11/8/2021.

Figure 2-1: Roadways Providing Regional Access to the Colorado Springs Airport



- SH 94 is a 2-lane east-west expressway that begins at the intersection with US 24, northeast of Peterson SFB, and continues east past Schriever SFB and through Ellicott, Yoder, and Rush until connecting with

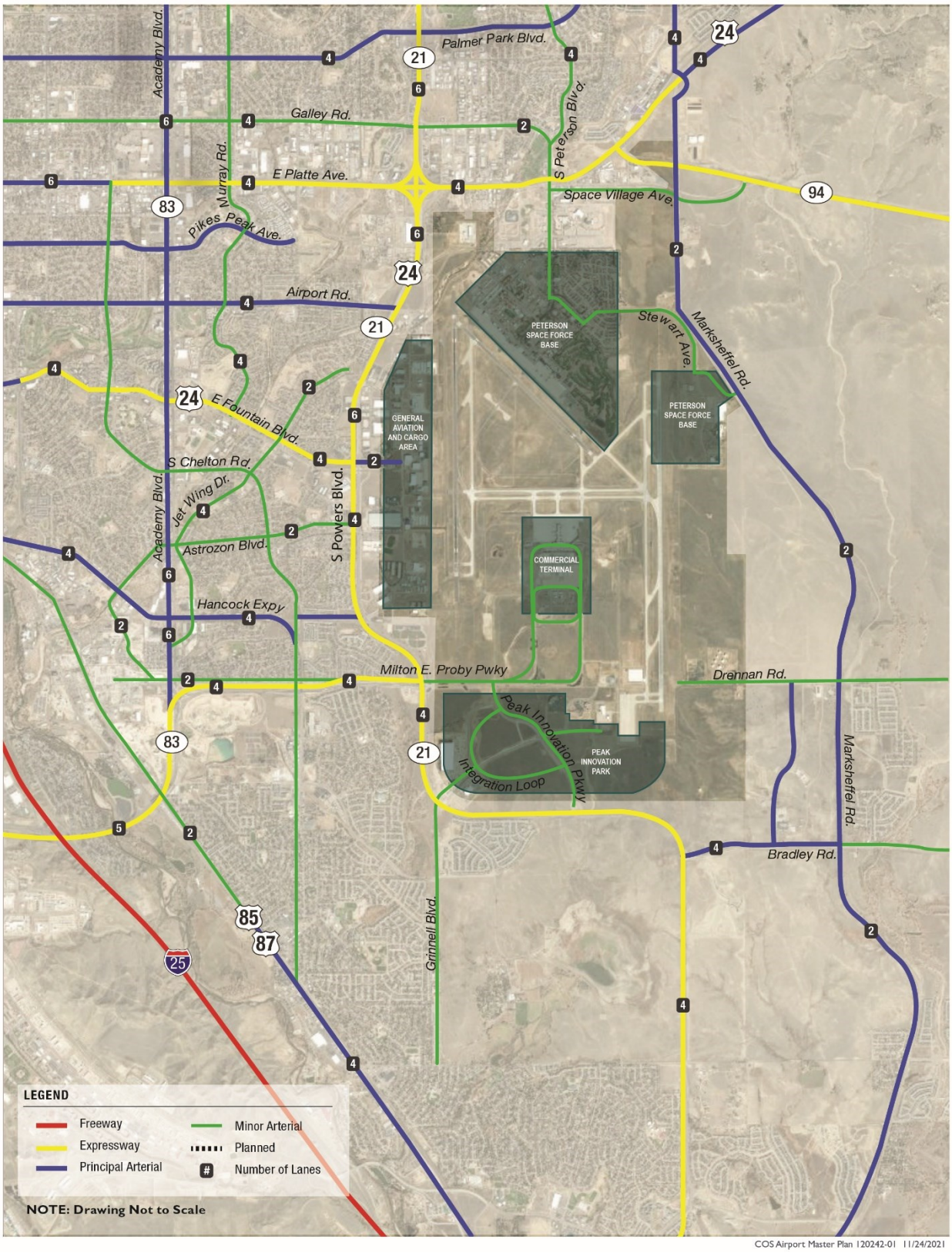
US 287, approximately 85 miles to the east, in Cheyenne County, Colorado. Year 2020 AADT was 8,400 east of Marksheffel Rd, 9,900 east of Space Village Ave, 10,000 east of Curtis Rd, and then ranged from 4,400 down to 440 on the eastern end. On its western end, 2020 truck traffic was low at 2.9 to 3.5 percent. However, on the eastern two-thirds of SH 94, truck traffic increased from 10.8 to 23.5 percent between Yoder Rd and Punkin Center.

- US 85 runs parallel to I-25 from Fountain to B Street in Colorado Springs. There are multiple connections to the Airport, such as Academy Blvd to Proby Pkwy and Powers Blvd via Mesa Ridge Pkwy, Fontaine Blvd, or Grinnell Blvd. OTIS indicates there are no stations measuring AADT on this segment.
- The regional network also includes local roads, including the following key north-south and east-west corridors:
  - North-south:
    - Marksheffel Rd: A principal arterial varying between two and four lanes
    - Academy Blvd: A 6-lane principal arterial
    - Peterson Blvd: A 4-lane minor arterial
    - Peak Innovation Pkwy: A 2-lane minor arterial
    - Aeroplaza Dr: A 2-lane minor arterial
    - Nevada Ave: A 4-lane principal arterial from Garden of the Gods Rd south to E. Cimarron Street
  - East-west:
    - Milton E. Proby Pkwy: Primarily operating as a 4-lane expressway
    - Woodmen Rd: An expressway from I-25 to US 24 varying from six to four lanes
    - Platte Ave: A principal arterial from N Nevada to N Academy Blvd and an expressway from N Academy Blvd to Peterson Rd
    - Hancock Expwy: A 4-lane principal arterial that turns south and becomes a minor arterial
    - Astrozon Blvd: A 2-lane minor arterial
    - Fountain Blvd: A 4-lane lane expressway aligned along US 24
    - Airport Rd: A 4-lane principal arterial
    - Integration Loop: A 2-lane minor arterial within Peak Innovation Park
    - Bradley Rd: A 4-lane principal arterial west of Marksheffel Rd and 2-lane minor arterial east of Marksheffel Rd

Local Roadways

This portion of the roadway inventory focuses on access roads with a functional classification of minor arterial and higher. Local and collector streets are not included in this inventory. **Figure 2-2** shows the roadway network surrounding the Airport and identifies the functional classification according to the roadways' current operations.

Figure 2-2: Roadway Network and Classifications Serving the Airport



Airport Access Points

Multiple roadways provide access to the Airport and the route varies dependent on which area of operation is being accessed. The following sections detail the existing network of roadways and intersections for each area of Airport operations.

Passenger Travel Terminal

The gateway to the Airport is located at the intersection of Proby Pkwy and Powers Blvd. All vehicles needing to access the passenger terminal traverse either Proby Pkwy or Powers Blvd.

West of the intersection, Proby Pkwy is a 2-mile, four-lane divided expressway that commences at S Academy Blvd. Proby Pkwy becomes the Airport's internal road and accesses long- and short-term parking, rental car operations, and curbside operations such as passenger drop-off/pickup.

Figure 2-3: Aerial view of Proby Pkwy & Powers Blvd intersection

Source: Google Earth Pro

Figure 2-3 shows that the intersection of Proby Pkwy and Powers Blvd is configured with right turn lanes in all directions; a single left-turn lane for vehicles exiting the airport; and dual left-turn lanes for northbound, eastbound, and southbound vehicles. The intersection is controlled with traffic lights and protected left-turn signals. Crosswalks and pedestrian signals are provided on all approaches.

General Aviation and Air Cargo Area

Four roadways provide access from Powers Blvd to the General Aviation and Air Cargo Area, which is served by Aviation Way along the Airport's western boundary. These intersections are signalized and spaced 0.5 to 0.7 miles apart.

- The north approach to the General Aviation and Air Cargo Area is Aeroplaza Drive, a minor arterial. **Figure 2-4** shows the intersection is signalized and configured with right-turn lanes and marked crosswalks.

Figure 2-4: Aerial View of Powers Blvd and Aeroplaza Drive

Source: Google Earth Pro

- Approximately 0.7 mile to the south is E Fountain Blvd, a roadway classified as freeway west of Powers Blvd due to its alignment with US 24. Fountain Blvd maintains its four-lane road section as it crosses Powers Blvd and becomes a turn-lane pair at its intersection with Aviation Way. **Figure 2-5** shows the intersection is signalized, configured with one left-turn lane on three approaches and dual left turn lanes on eastbound US 24. There are marked crosswalks and pedestrian refuge islands on each corner.

Figure 2-5: Aerial View of Powers Blvd and US 24/ E Fountain Blvd

Source: Google Earth Pro

- West of Powers Blvd, Astrozon Blvd is a two-lane minor arterial. **Figure 2-6** shows the intersection is signalized and configured with a left-turn lane on all approaches, pedestrian islands, and crosswalks.

Figure 2-6: Aerial View of Powers Blvd and Astrozon Blvd

Source: Google Earth Pro

- At its intersection with Powers Blvd, Hancock Expressway (Expy) is a four-lane principal arterial with existing capacity of 32,000 vpd. East of Powers, the roadway narrows to the two-lane local road Zeppelin Rd. **Figure 2-7** shows the intersection is signalized, configured with left-turn lanes in all directions, pedestrian refuge islands, and marked crosswalks.

Figure 2-7: Aerial View of Powers Blvd and Hancock Expressway

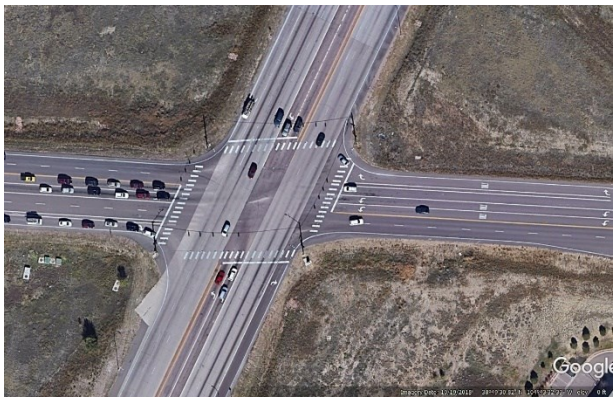
Source: Google Earth Pro

Peterson Space Force Base (SFB)

Three roadways provide access to Peterson SFB at the north end of the Airport. All access roads require travel through staffed security gates.

- From S Powers Blvd, Airport Rd becomes Stewart Ave and accesses the base via the West Gate. Airport Rd is a four-lane principal arterial from Circle Dr to Powers Blvd. **Figure 2-8** shows the intersection is signalized, configured with dual left turns in all directions, and marked with crosswalks.

Figure 2-8: Aerial View of Powers Blvd and Airport Rd



Source: Google Earth Pro

- From Platte Ave/US 24, Peterson Blvd, eastbound travelers exit to Space Village Ave to reach Peterson Rd. Westbound travelers exit to Peterson Rd, a four-lane minor arterial at its south end. **Figure 2-9** shows the grade-separated interchange and the median-divided Peterson Rd north of the security gate.

Figure 2-9: Aerial View of US 24/Platte Ave Interchange and Peterson Rd/ Space Village Ave Intersection

Source: Google Earth Pro

- Travelers accessing Peterson SFB via the East Gate exit Marksheffel Rd onto Stewart Ave, a two-lane road classified as minor arterial. **Figure 2-10** shows the signalized T-intersection configuration with turn lanes and raised medians on all approaches.

Figure 2-10: Aerial View of Marksheffel Rd at East Gate Access

Source: Google Earth Pro

Peak Innovation Park

Peak Innovation Park is a mixed-use development within the Airport property boundary. Multiple access points include Proby Pkwy, Grinnell Blvd/Integration Loop/Embraer Hts, and Peak Innovation Pkwy, each from respective intersections with Powers Blvd.

- Airport travelers will continue east on Proby Pkwy to access airport operations such as passenger pickup/dropoff, short- and long-term parking, and rental car facilities. Travelers to the business park will mix with eastbound airport-bound travelers, a four-lane expressway, until turning south onto Peak Innovation Pkwy. **Figure 2-11** shows the roadway configuration at this intersection.

Figure 2-11: Aerial View of Proby Pkwy and Peak Innovation Pkwy Intersection

Source: Google Earth Pro

- The intersection of Powers Blvd and Grinnell Blvd (an El Paso County road) provides access to the southwest corner of Peak Innovation Park, particularly the Amazon facilities along Integration Loop. Recent intersection improvements were completed to accommodate increasing traffic associated with the business park. **Figure 2-12** illustrates the right turn lanes in all directions.

Figure 2-12: Aerial View of Powers Blvd Intersection with Grinnell Blvd/ Integration Loop

Source: City of Colorado Springs

- Peak Innovation Pkwy provides a north-south connection from Proby Pkwy to Powers Blvd. Once open, this internal road of the business park may provide an alternative route for travelers arriving from the south or southeast. At the point of intersection, Powers Blvd traffic has the right-of-way and is not stop controlled. **Figure 2-13** shows that Peak Innovation Pkwy is configured with a right-turn lane/left-turn lane pair and is stop controlled for vehicles exiting to Powers Blvd, a divided highway.

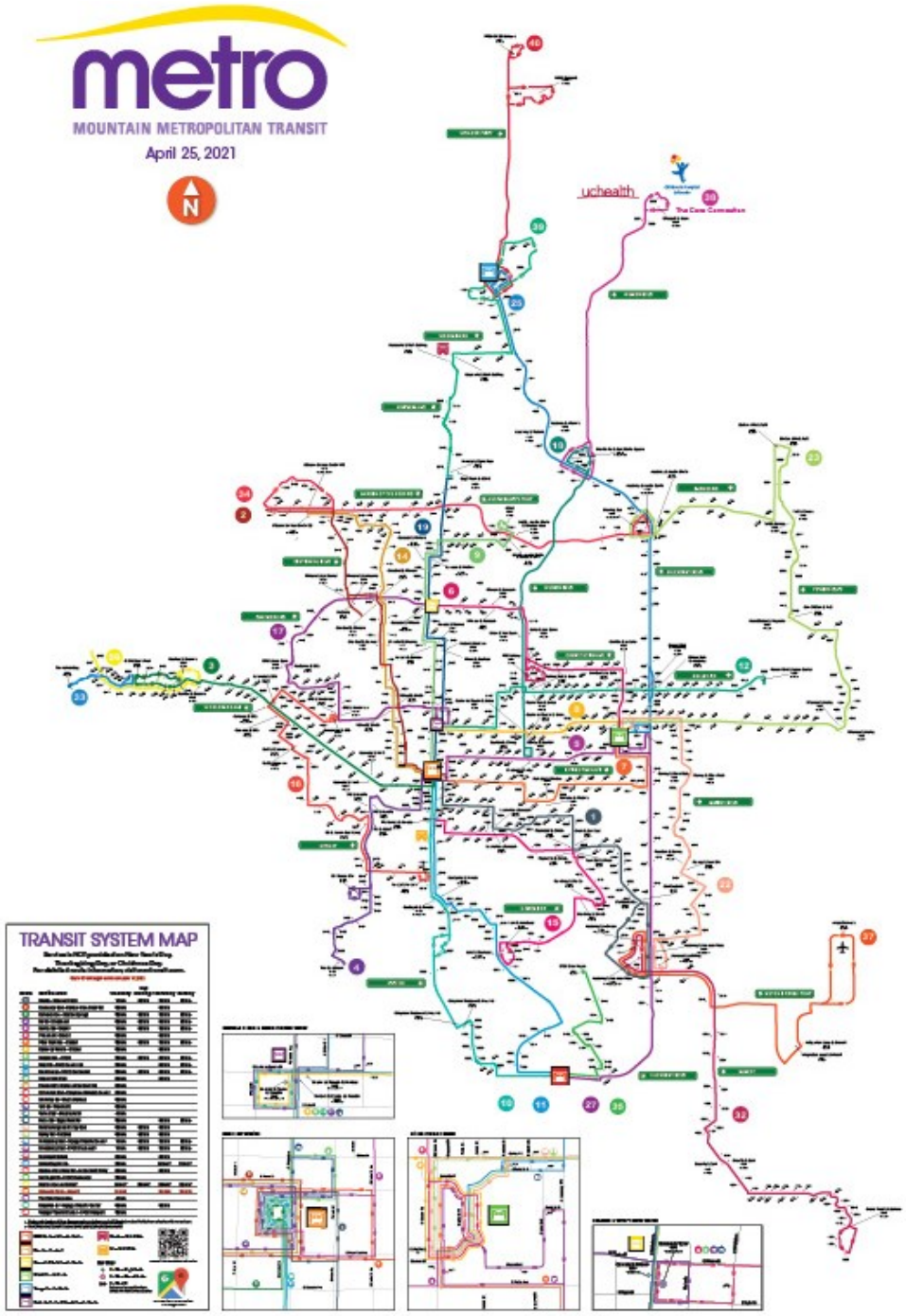
Figure 2-13: Aerial View of Powers Blvd and Peak Innovation Parkway

Source: Google Earth Pro

Transit Network

The City of Colorado Springs provides public transportation to the Airport via Mountain Metro Transit (MMT), a provider of fixed-route bus service, and Mountain Metro Mobility, an Americans with Disabilities Act (ADA) demand-response paratransit service for individuals who are unable to use fixed-route bus service due to a disability. **Figure 2-14** shows the existing MMT fixed-route system map. The map includes Route 37, which began offering service to the Airport in June 2021 (as noted in the legend).

Figure 2-14: Mountain Metro Transit System Map (April 2021)



Route 37

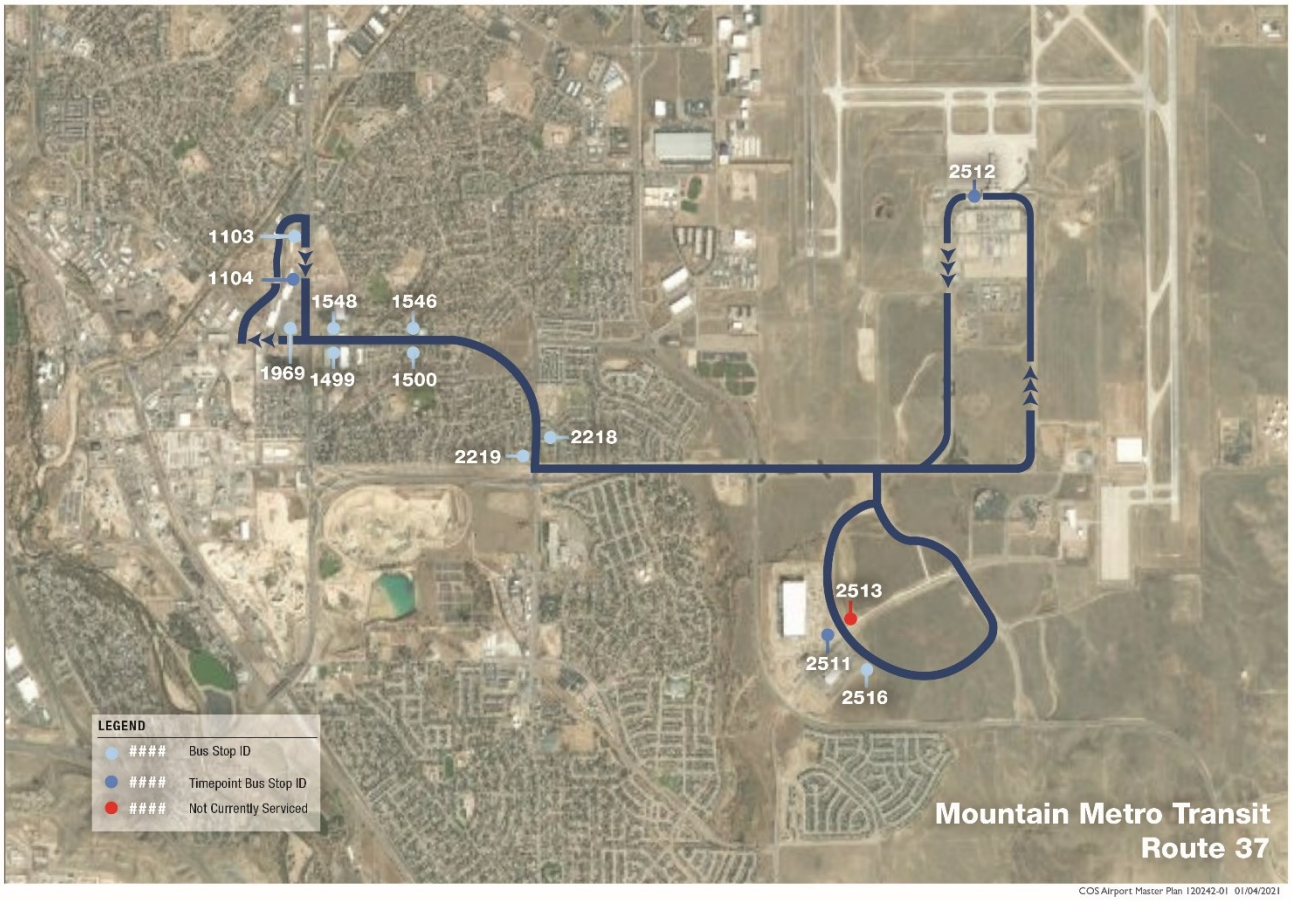
The initial route commenced June 13, 2021, to serve the Airport and Peak Innovation Park. The route operates with 40-minute headways.

Hours of service are:

- Monday through Friday, 6:15 am to 10:15 pm
- Saturday and Sunday, 6:15 am to 6:15 pm

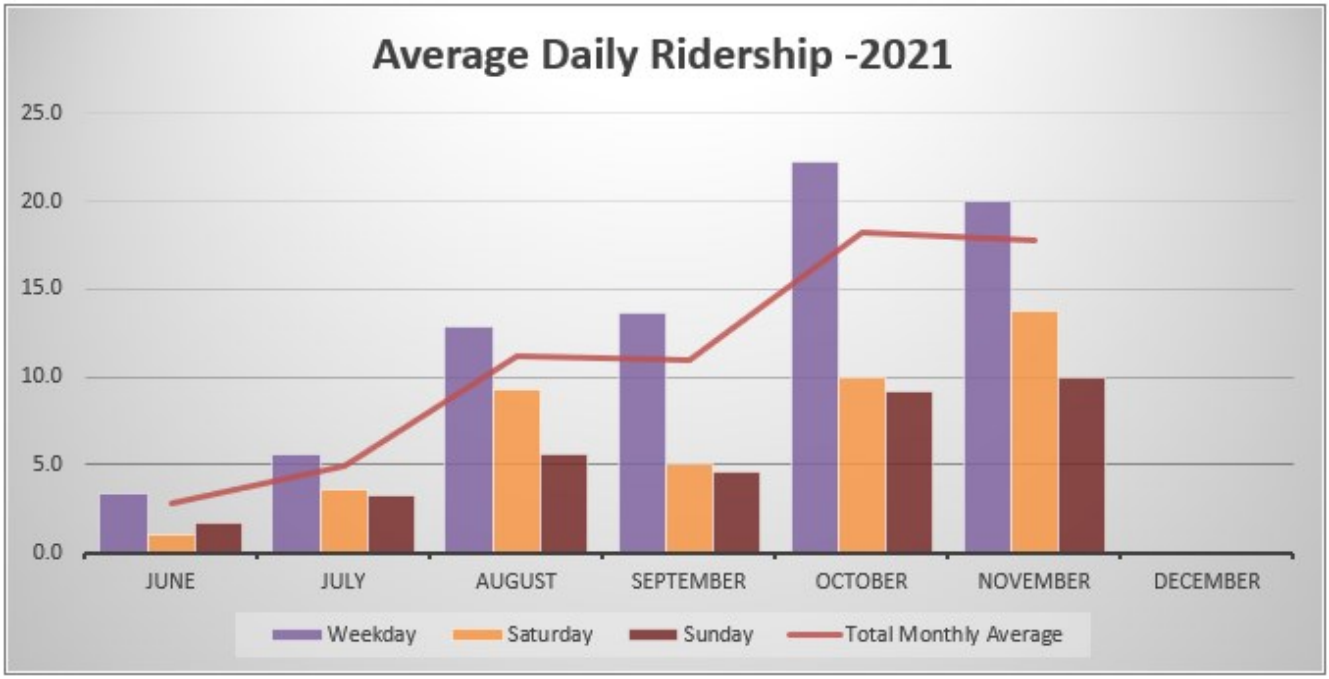
Figure 2-15 shows the map of Route 37, which includes a loop around Peak Innovation Park's internal road network both before and after accessing the Airport terminal. The route's scheduled timepoints include the bus stops at Academy and Hancock, Integration Loop, and the passenger terminal. Additional stops are available along the route.

Figure 2-15: MMT's Route 37



As shown in **Figure 2-16**, data provided by Mountain Metro Transit reveals a trend of increasing ridership and notes November's weekday ridership may be due to two less service days in November than October. The November 2021 Ridership Report indicates that Route 37 has provided a total of 1,959 unlinked passenger trips since its inception in June 2021.[2]

Figure 2-16: Average Daily Ridership of MMT's Route 37



Source: Mountain Metro Transit

Connecting Routes

Bus riders who use MMT Routes 1, 22, 27, and 32 may connect with Route 37 at Hancock Plaza, increasing the possibility of bus travel to the Airport. The connections would serve riders from Downtown, Citadel Mall Transfer Center, and Security-Widefield.

- Route 1 travels between the Downtown Terminal and Hancock Plaza.
- Route 22 travels between the Citadel Mall Transfer Center and Hancock Plaza, primarily along Murray Blvd.
- Route 27 travels between the Citadel Mall Transfer Center and Pikes Peak Community College.
- Route 32 travels between Security-Widefield and Hancock Plaza.

Additional MMT routes are in service and would connect via the Downtown Terminal or three transfer centers at Citadel Mall, Cache La Poudre & Nevada, or Cascade & Taylor. Route 37 is the only direct route. All other routes require a connection at Hancock Plaza, adding time to the transit trip.

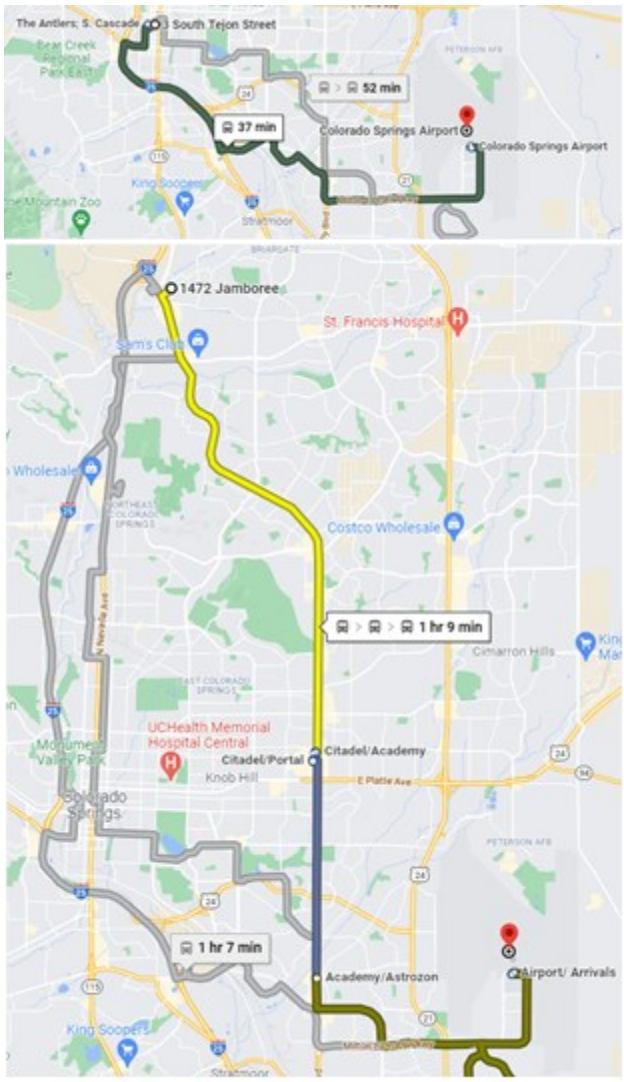
Transit Trip Planning

Transit riders can visit MMT's website, which includes a Trip Planner feature to identify trip options and travel times. The function links to Google maps and appears to be dependent on time of day as it includes real-time information regarding active routes and timeliness (e.g., "on time").

[2] MMT November 2021 Route 37 Monthly Ridership Report

Figure 2-17 shows results for two example exercises: travel from Downtown Colorado Springs and travel from north Colorado Springs to the Airport.

Figure 2-17: Example "Plan Your Trip" with Transit



For example, the transit options from Downtown to the Airport include a trip on MMT requiring two connecting bus routes (52 minutes) or a trip by private shuttle (37 minutes).

A second example shows the trip planner results for travel from the bus stop (1472 Jamboree) near Chapel Hills Mall in north Colorado Springs to the Airport. The shortest option is a 67-minute trip by private shuttle. Travel time for MMT trip options ranges from 69 minutes to 1 hour, 46 minutes, and requires two transfers among three buses. Transfer passes are free but must be requested from the driver upon boarding and are good for only two hours.

Ground Transportation Providers

Ground transportation other than public transit is available via private entities. **Table 2-1** shows the number of providers by type operating in 2021. **Figure 2-18** details the business names of existing private operators.

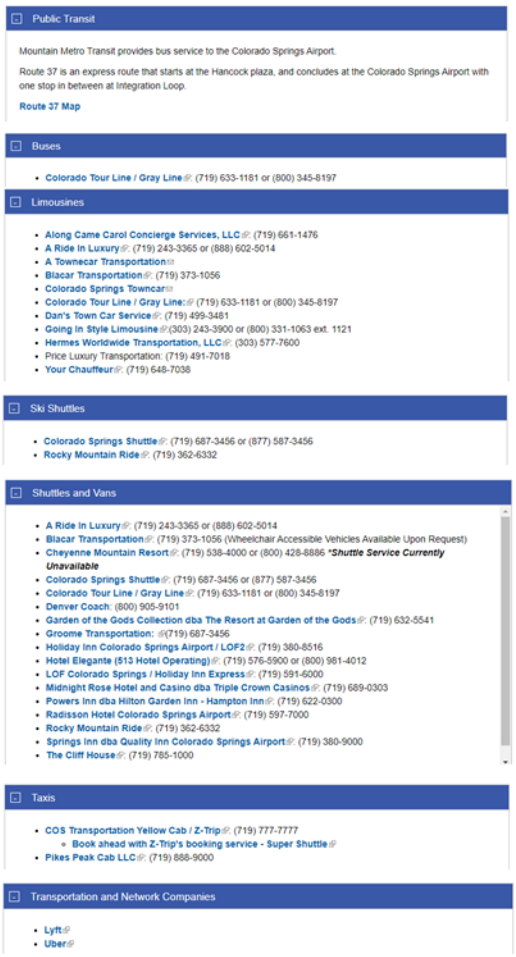
The Airport does not own, run, or manage these providers. Such providers are privately operated and typically for profit; therefore, ridership numbers were not available for this report.

Table 2-1: Private Ground Transportation Providers by Type

Type	Number of Providers[1]
Buses	1
Limousines	11
Shuttles and Vans	17
Ski Shuttles	2
Taxis	2
Transportation and Network Companies	2

Source: https://coloradosprings.gov/flycos/ground-transportation?mlid=33301 accessed September 13, 2021.

Figure 2-18: Private Ground Transportation Providers (2021)


Public Transit
Mountain Metro Transit provides bus service to the Colorado Springs Airport.
Route 37 is an express route that starts at the Hancock plaza, and concludes at the Colorado Springs Airport with one stop in between at Integration Loop.
Route 37 Map
Buses
Colorado Tour Line / Gray Line (719) 633-1181 or (800) 345-8197
Limousines
Along Came Carol Concierge Services, LLC (719) 661-1476
A Ride In Luxury (719) 243-3365 or (888) 602-5014
A Townecar Transportation
Blacar Transportation (719) 373-1056
Colorado Springs Towncar
Colorado Tour Line / Gray Line (719) 633-1181 or (800) 345-8197
Dan's Town Car Service (719) 499-3481
Going In Style Limousine (303) 243-3900 or (800) 331-1063 ext. 1121
Hermes Worldwide Transportation, LLC (303) 577-7600
Price Luxury Transportation: (719) 491-7018
Your Chauffeur (719) 648-7038
Ski Shuttles
Colorado Springs Shuttle (719) 687-3456 or (877) 587-3456
Rocky Mountain Ride (719) 362-6332
Shuttles and Vans
A Ride In Luxury (719) 243-3365 or (888) 602-5014
Blacar Transportation (719) 373-1056 (Wheelchair Accessible Vehicles Available Upon Request)
Cheyenne Mountain Resort (719) 538-4000 or (800) 428-6886 *Shuttle Service Currently Unavailable
Colorado Springs Shuttle (719) 687-3456 or (877) 587-3456
Colorado Tour Line / Gray Line (719) 633-1181 or (800) 345-8197
Denver Coach: (800) 905-9101
Garden of the Gods Collection dba The Resort at Garden of the Gods (719) 632-5541
Groome Transportation: (719) 687-3456
Holiday Inn Colorado Springs Airport / LOF2 (719) 380-8516
Hotel Elegante (513 Hotel Operating) (719) 576-5900 or (800) 981-4012
LOF Colorado Springs / Holiday Inn Express (719) 591-6000
Midnight Rose Hotel and Casino dba Triple Crown Casinos (719) 689-0303
Powers Inn dba Hilton Garden Inn - Hampton Inn (719) 622-0300
Radisson Hotel Colorado Springs Airport (719) 597-7000
Rocky Mountain Ride (719) 362-6332
Springs Inn dba Quality Inn Colorado Springs Airport (719) 380-9000
The Cliff House (719) 785-1000
Taxis
COS Transportation Yellow Cab / Z-Trip (719) 777-7777
Book ahead with Z-Trip's booking service - Super Shuttle
Pikes Peak Cab LLC (719) 888-9000
Transportation and Network Companies
Lyft
Uber

Active Transportation Network

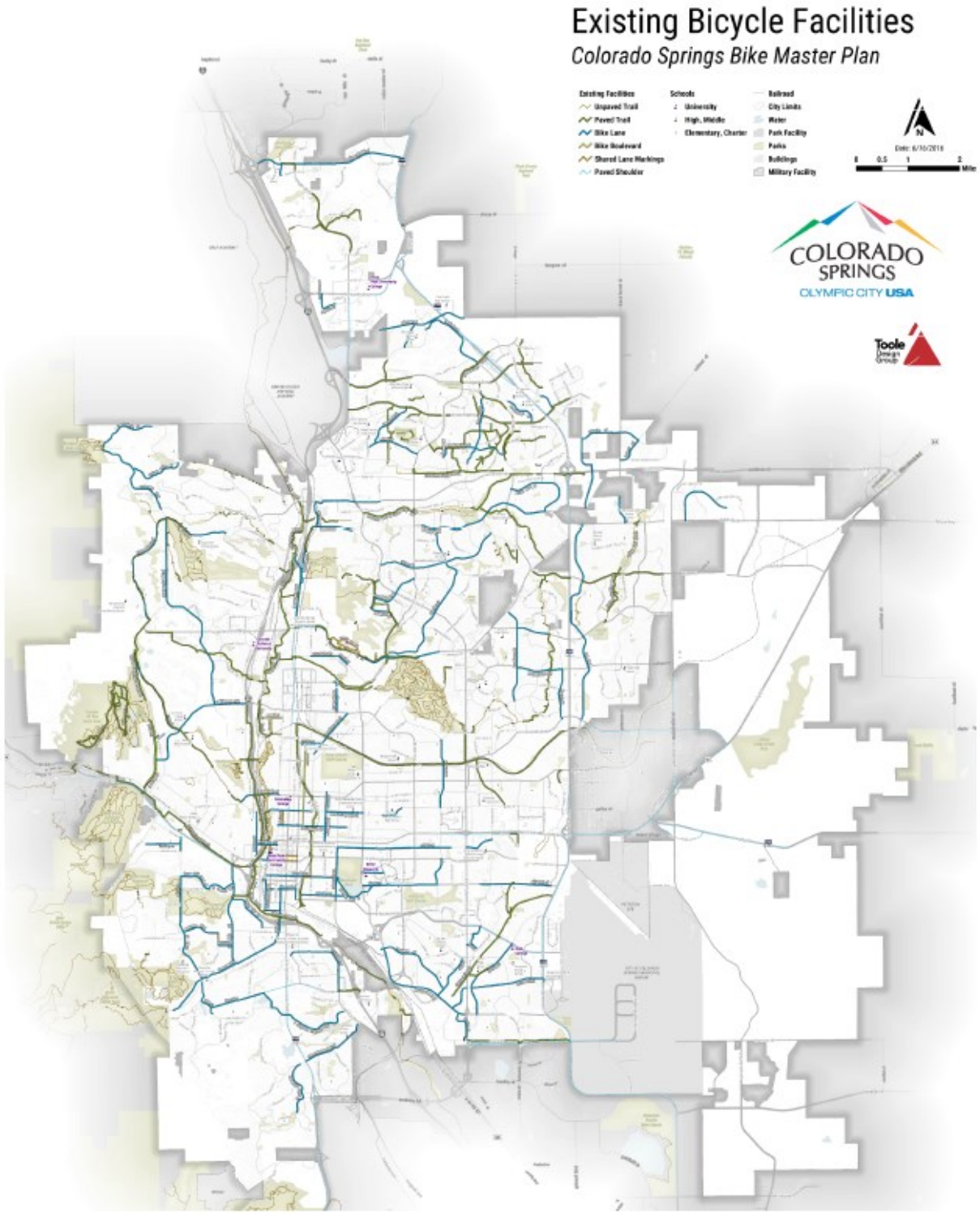
While airport travelers tend to travel to the passenger terminal by vehicle, airport employees may be more likely to commute to work by active transportation modes, particularly bicycle.

Existing designated facilities to provide connectivity for bike travel are limited but include bike routes, bike lanes, urban trails, and roadway shoulders. **Figure 2-19** shows the COS Bikes! Master Plan existing bike facilities map. Bike facilities in the vicinity of the Airport include

- Dedicated bike lanes along Astrozon (west of Powers Blvd)
- Shared-use trail and paved shoulder along Proby Pkwy
- Dedicated bike lanes along Integration Loop (within Peak Innovation Park)
- Paved shoulders along Platte Ave, E Fountain Blvd/US 24, and Powers Blvd

Additionally, the General Aviation and Air Cargo area includes a considerable pedestrian network of facilities such as sidewalks, curb ramps, refuge islands, and painted crosswalks.

Figure 2-19: Existing Bicycle Facilities



Source: COS Bike Master Plan

Truck Routes

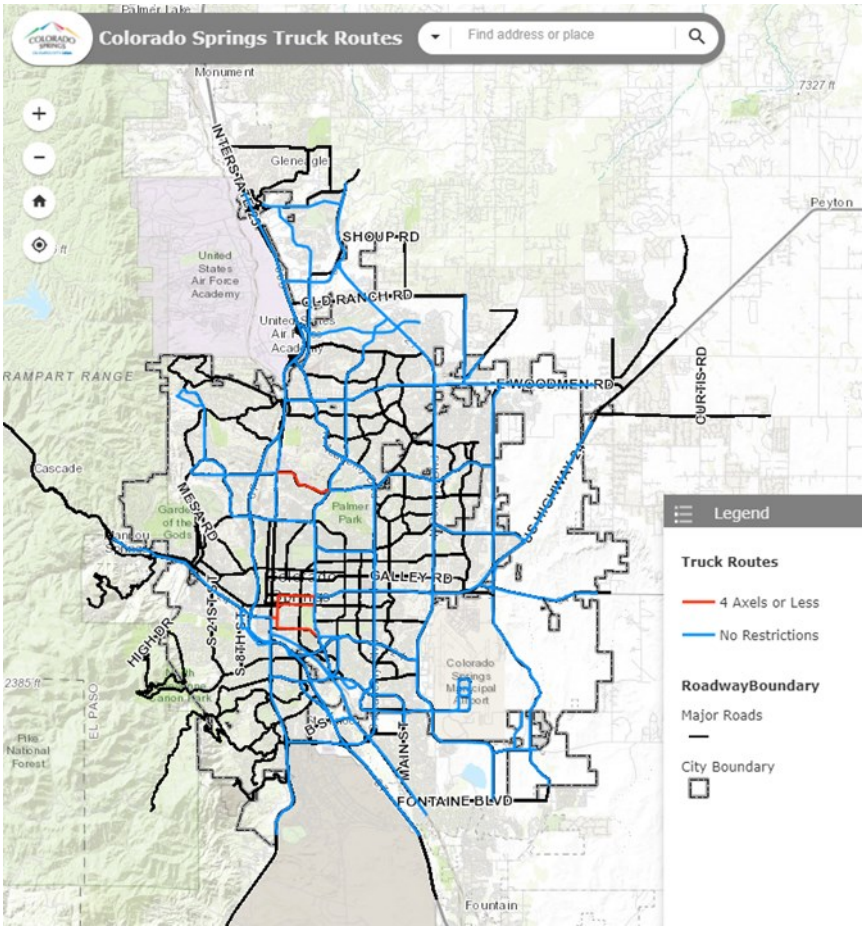
Though a small percentage of freight is transported by air when compared to other modes, the Colorado Springs Airport still plays a role in the conveyance of freight and Colorado's multimodal freight system. The truck route network connects the Airport to the region, including I-25, a primary freight corridor within the state. CDOT's 2019 Colorado Freight Plan identifies the Colorado Springs Airport as one of 34 Intermodal Facilities serving as a multimodal hub connected to the national Highway System. [3]

Air cargo services at the Colorado Springs Airport include the FedEx Ship Center on Aviation Way. Amazon logistics facilities within Peak Innovation Park include a distribution facility, a warehouse, and a sorting center.

Truck traffic to/from the Airport is well served by the roadway network. **Figure 2-20** shows the City's truck routes. The blue lines indicate arterials with no restrictions on trucks. The corridors that encircle the Airport include Powers Blvd, Platte Ave/US 24, Marksheffel Rd, and Bradley Rd. Additional roads shown that connect the Airport to the regional freight network include Proby Pkwy, US 94, and Academy Blvd.

The 2019 Colorado Freight Plan details critical freight corridors throughout the state. Within Colorado Springs and near the Airport, the plan includes two segments of US 24: from SH 21 to Airport Rd and from SH 21 to Constitution Ave. Infrastructure and safety needs for both segments are identified as limited shoulder widths and congested bottleneck areas.

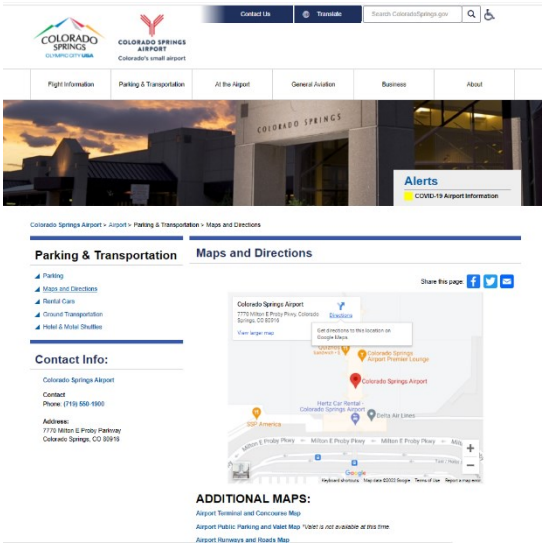
Figure 2-20: Colorado Springs Truck Route Map



(Source: https://www.arcgis.com/apps/webappviewer/index.html?id=8752c6ece19143dc8fb65dfb3e7f3f5e)

[3] Colorado Freight Plan, 2019, page 78

Wayfinding

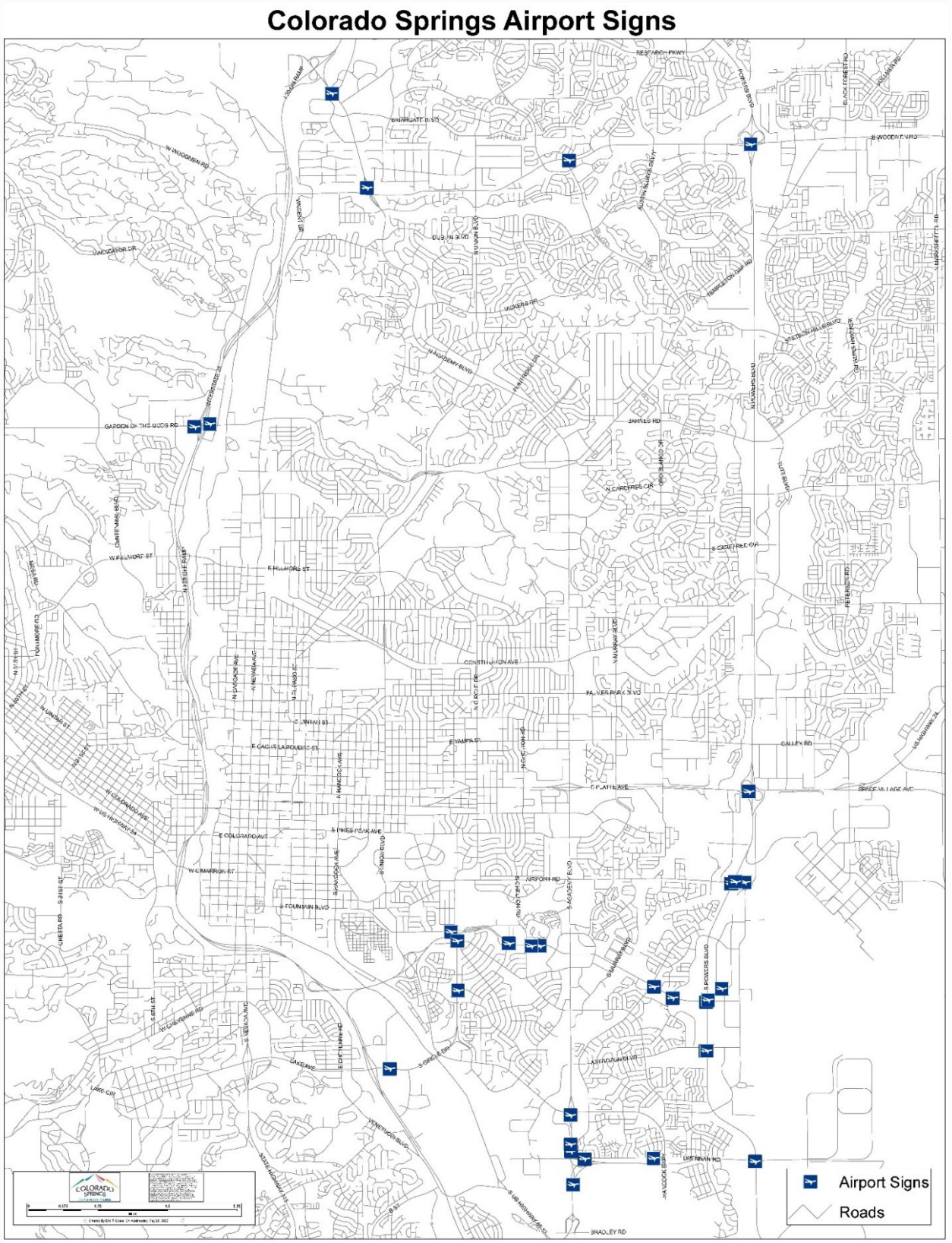


Wayfinding is the process of using information sources to travel from one point to another. Common wayfinding tools include signs, printed maps, online maps, travel mode options such as bus routes, pavement markings, and smartphone applications. Those who work at or live near the Airport become familiar with available routes by mode of travel. Travelers unfamiliar with Colorado Springs may rely on roadway signage, electronic devices, or verbalized directions as they seek to navigate their way to the Airport.

The Colorado Springs Airport website provides a good starting point, with essential information such as address, telephone number, and links to maps, directions, and ground transportation and shuttle providers.

Approximately 30 directional signs are currently provided on City and CDOT roadways directing travelers to the Airport. **Figure 2-21** shows the location of the City's signs along several Airport access routes including I-25, Academy Blvd/Milton E. Proby Pkwy, US 24/Fountain Blvd, Circle Dr, Powers Blvd, and Woodmen Rd.

Figure 2-21. Colorado Springs Airport directional signs



Source: City of Colorado Springs Department of Public Works Sign Inventory

3. State of the Surface Transportation Network

Reliable roadway access, roadway and intersection performance, and traffic flow are important to vehicles traveling to/from the Airport. Congestion on the way to airports can stress travelers, who may worry about missing their flights.

A study of transportation and mobility in Colorado Springs is ongoing at the same time of this Airport Master Plan update. The study, named ConnectCOS, provides insight into the performance of the transportation network of Colorado Springs. Insightful information regarding the Airport vicinity can be extracted to inform this report.

The technical analysis included:

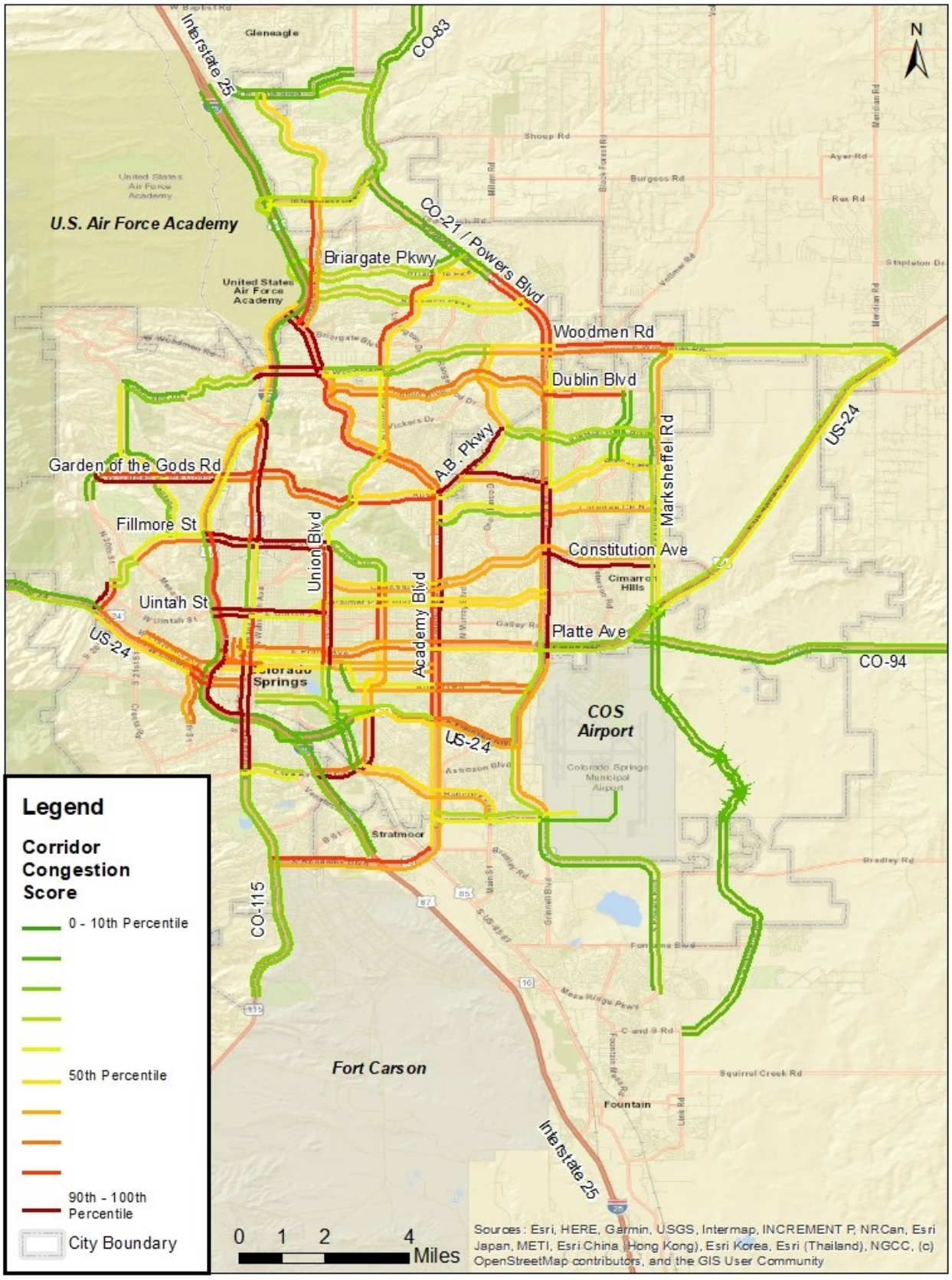
- **INRIX Data Analysis**: A travel pattern analysis to identify areas of vehicular traffic congestion within the city
- **Forecasts and Travel Demand Model**: Use of the Pikes Peak Area Council of Governments (PPACG) Regional Travel Demand Model to evaluate congestion in 2020 and future congestion in 2045
- **Crash Data Analysis**: Traffic safety analysis with Colorado Springs Police Department crash data
- **Streetlight Data Analysis**: Analysis of anonymized cellphone data using StreetLight data to identify travel patterns

Travel Time Data Analysis

INRIX data were used to conduct a travel-time analysis and compare the performance of corridors and intersection approaches to one another within the City's network. **Figure 3-1** shows that Platte Ave, Marksheffel Rd, and Powers Blvd (southbound and south of Proby Pkwy) are performing well or relatively well when compared to other key corridors in the city. Northbound Powers Blvd, US 24, and other east-west corridors rank poorly.

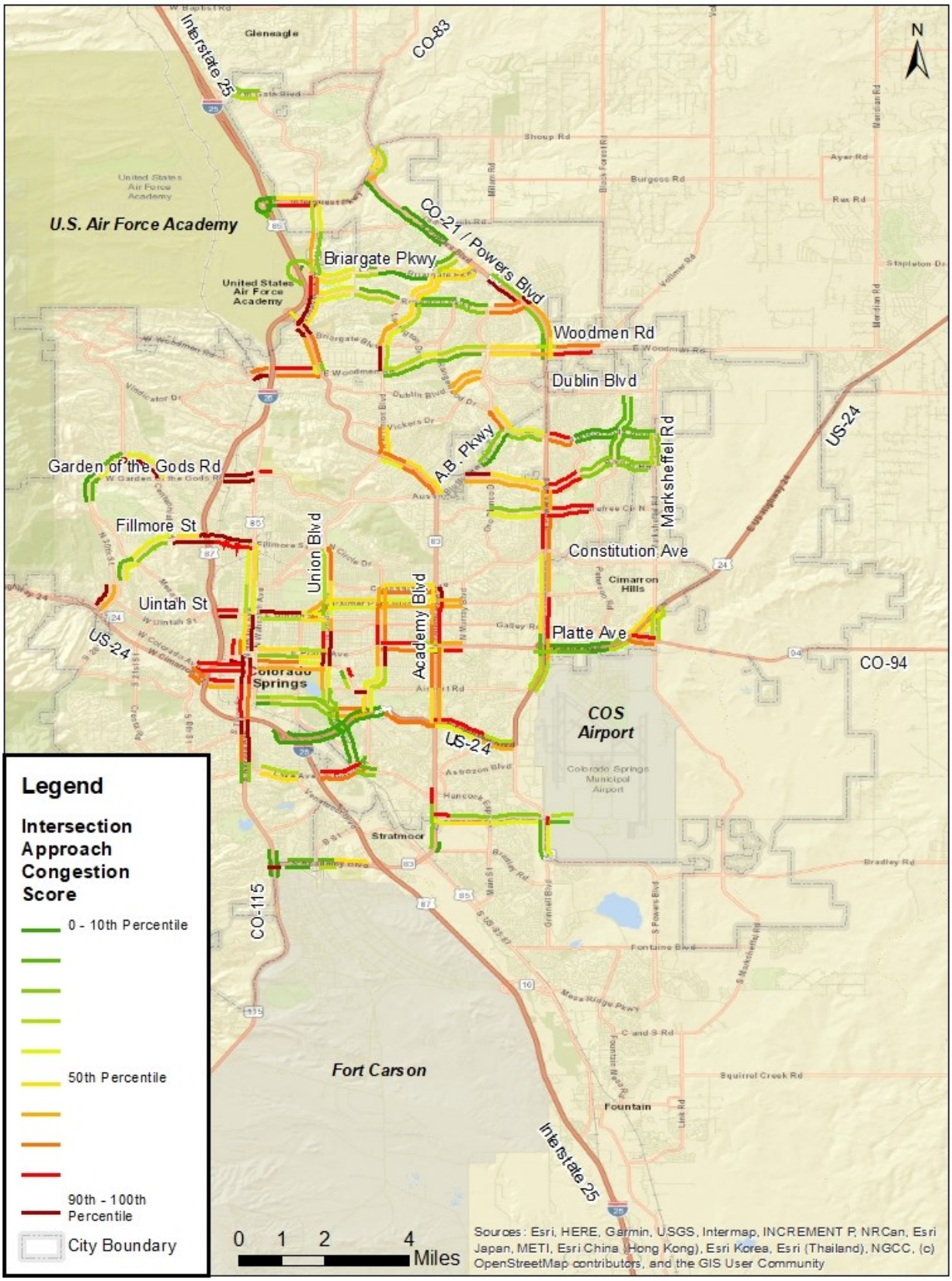
Similarly, **Figure 3-2** shows the relative performance of intersection approaches within the city. Near the Airport, intersection approaches near US 24/SH 94, US 24/Powers Blvd, and both ends of Proby Pkwy perform poorly relative to other areas of the city.

Figure 3-1: Corridor Congestion Score



Source: ConnectCOS

Figure 3-2: Intersection Approach Congestion Score



Source: ConnectCOS

Forecasts and Travel Demand Model

The ConnectCOS project team consulted the PPACG Travel Demand Model in its analysis of 2045 modeled roadway operating conditions. By comparing daily traffic volume forecasts to the capacity, based on the functional classification and number of through lanes, for roadways, the ratio of volume to capacity (V/C) can be calculated and mapped.

Error! Reference source not found. shows the corridors that are projected to be over or near capacity in 2045 if no improvements were made to the existing roadway network.

- Over Capacity roads in the vicinity of the Airport without any improvements (shown in red) include:
  - Powers Blvd, from Carefree Cir to Bradley Rd
  - Platte Ave, from Circle Dr to Constitution
  - S Academy Blvd, from I-25 to US 85
  - US 24, from Union Blvd to Powers Blvd
  - E Fountain Blvd, east of Powers Blvd
  - I-25, south of S Academy Blvd
  - Hancock Expy, from Circle Dr almost to Academy Blvd
  - Airport Rd, from Murray to Powers Blvd
  - Marksheffel Rd, from Space Village Dr to Old Drennan Rd, and south of Bradley Rd
  - Bradley Rd, east of Marksheffel Rd

Section 5 of this report presents plans that are in place to address these projected over-capacity roadways over the next 20 years.

Figure 3-3. 2045 Volume/Capacity with No Roadway Improvements

Source: ConnectCOS

Travel Pattern Analysis: StreetLight Data

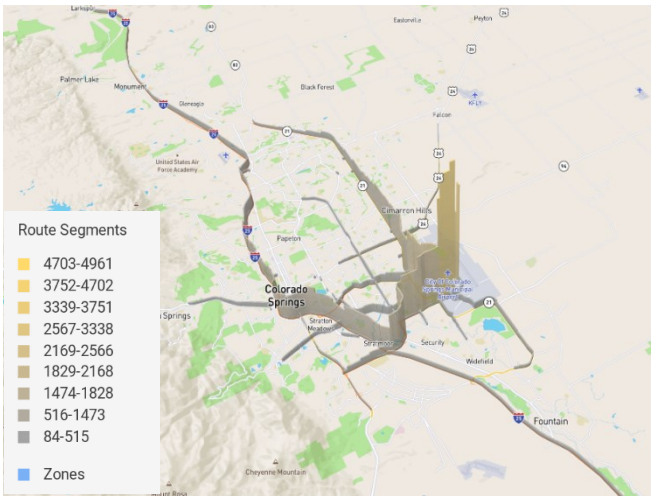
An analysis of StreetLight data provided insight into travel patterns. StreetLight data use signals from digital sources such as smartphones, GPS signals, and connected vehicles. Within the StreetLight software platform, analysis zones were located across the north/south legs of the Airport's entrance road. These data can be used to illustrate the routing and proportion of trips crossing the analysis zone.

StreetLight data were obtained for the entire year of 2019 (pre-Covid) and a three-month period of 2021, from March 15 to June 15.

Top Routes Analysis

Error! Reference source not found. provides a visual representation of the top routes to the airport analysis. The high point in the image represents the summation of all vehicles eventually reaching the Airport.

Figure 3-4. Top Routes



Source: Streetlight Data Analysis

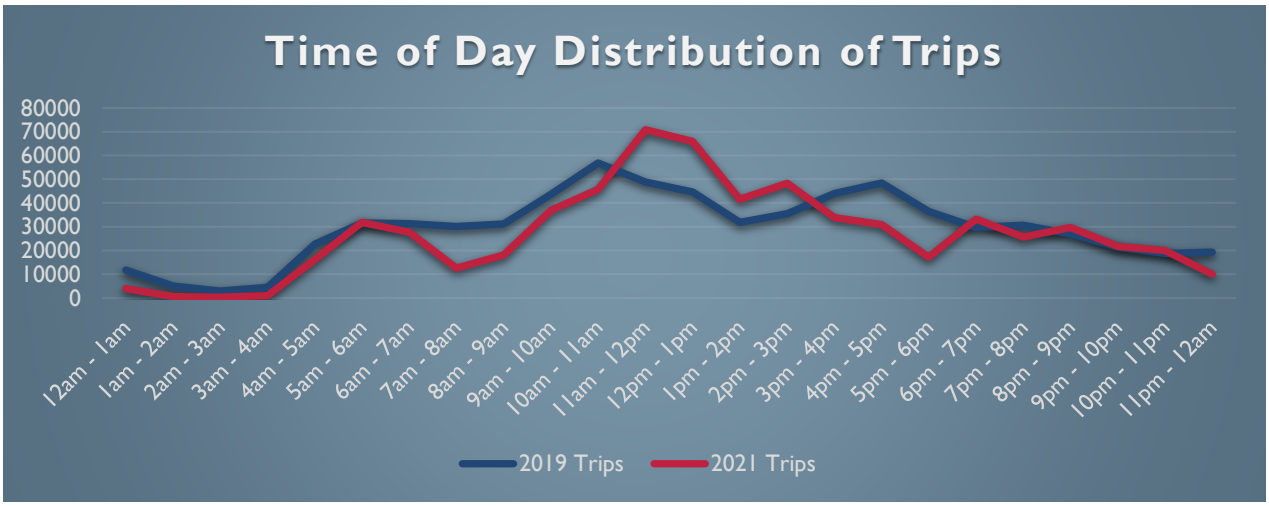
The top routes include corridors identified as ConnectCOS Critical Corridors (emphasized in ***bold italic***):

- *I-25 to* ***S Academy Blvd*** to Proby Pkwy
- ***Powers Blvd*** to the north
- ***Platte Ave*** toward downtown
- ***US 24/E Fountain Blvd*** toward downtown and I-25

Error! Reference source not found.**5** shows the time-of-day distribution of trips. In 2019, the highest occurring percentage of trips by hour was 8.03 percent (10 am – 11 am), followed 6.90 percent (11 am – 12 pm). Thus, late morning travel accounted for 14.93 percent of all trips.

In the three-month period of 2021, the midday peak increased slightly and shifted by one hour, with 11.00 percent (11 am – 12 pm) and 10.24 percent (12 pm – 1 pm), thus a total of 21.24 percent of all trips.

Figure 3-5. Top Routes, Time of Day Distribution of Trips



Source: Streetlight Data Analysis

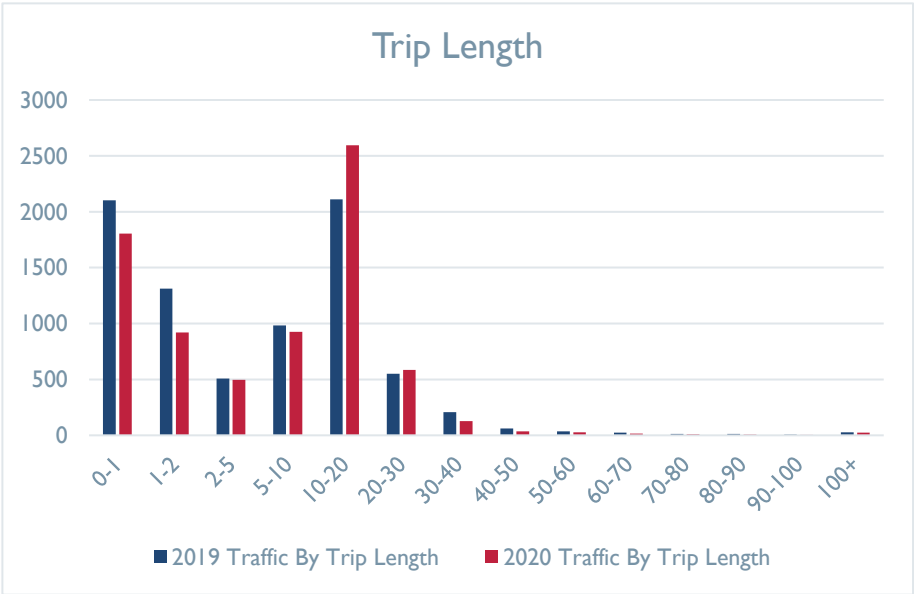
Trip Character

The Streetlight data reveal interesting insight about trip character, including Trip Length, Trip Duration, and Trip Purpose.

Trip Length

Error! Reference source not found. shows that in both 2019 and 2021, the most frequently occurring trip length was 10 to 20 miles, followed by 0 to 1 mile.

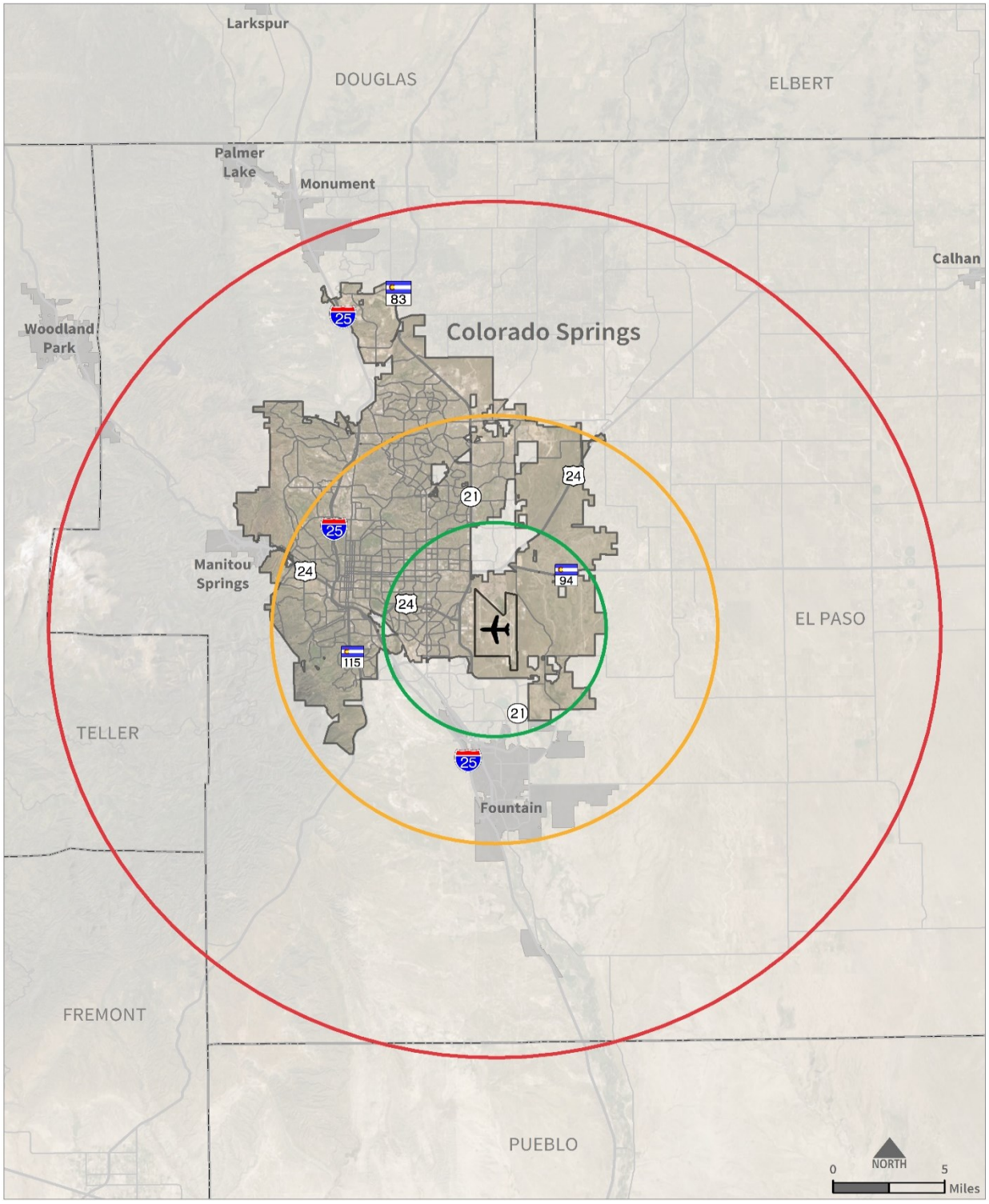
Figure 3-6. Trip Length



Source: Streetlight Data Analysis

To better visualize the geography of these data, the green, yellow, and red circles on Error! Reference source not found.**7** represents the 5-, 10-, and 20-mile radius from the Airport. Origins within the 10- to 20-mile distance include north Colorado Springs, Fort Carson, the U.S. Air Force Academy, Manitou Springs, south Monument, outlying areas of El Paso County, and portions of Teller and Fremont counties.

Figure 3-7. Regional Map Illustrating a 5-, 10-, and 20-mile Radius from the Airport



Trip Duration

Figure 3-8 shows that trip duration of 0 to 10 minutes was most frequently occurring in both 2019 and 2021, followed by 10 to 20 minutes and 20 to 30 minutes.

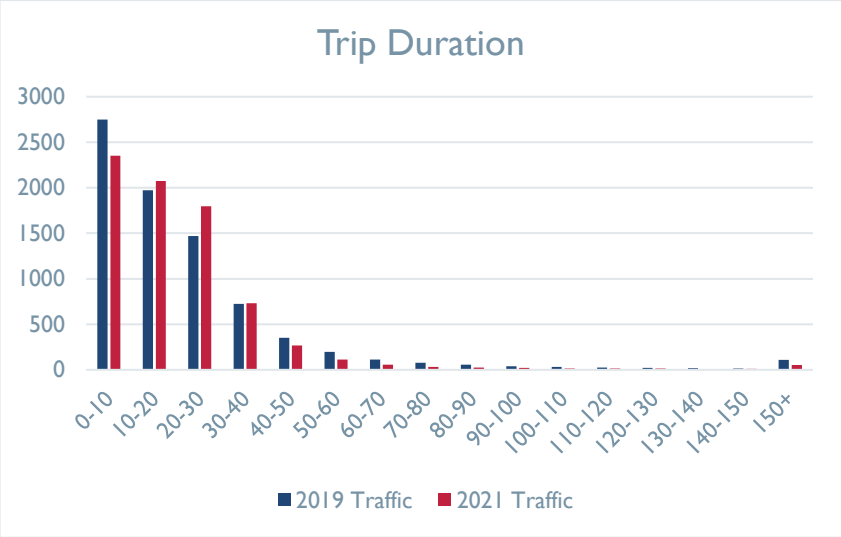
Trip Purpose

StreetLight data use cellphone data patterns to provide insight into the origins, destinations, and characteristics of vehicle trips. While not precise, StreetLight analysis can provide reasonable estimates of the purposes of trip types by general purpose.

Figure 3-9 shows the results of this analysis for trips to and from the Airport:

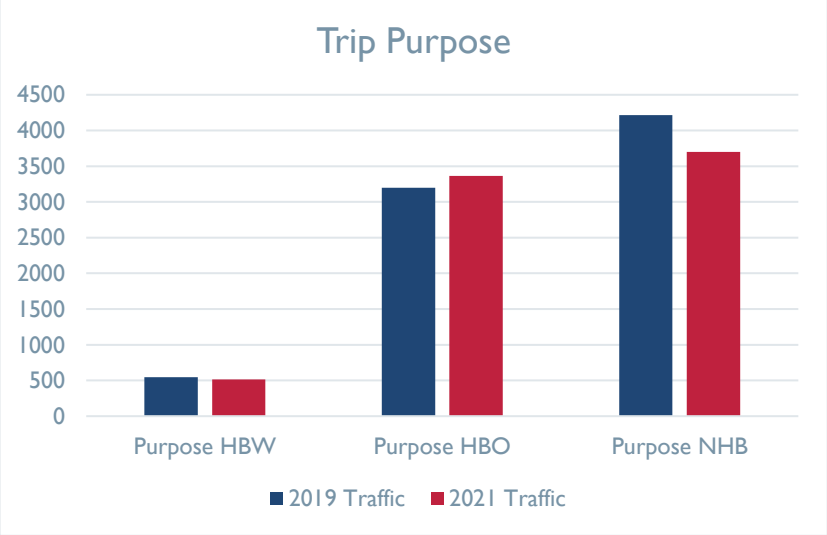
- Home Base Work (HBW) – An estimated 7 percent of airport trips are commuting trips for workers at the Airport.
- Home Based Other (HBO) – An estimated 44 percent of airport trips are between home and the Airport, including passengers driving to/from the Airport to/from home.
- Non-Home Based (NHB) – An estimated 49 percent of airport trips are between a non-home location and the Airport, such as passengers driving to/from the Airport to/from hotels, offices, and family or friends' houses.

Figure 3-8. Trip Duration



Source: Streetlight Data Analysis

Figure 3-9. Trip Purpose



Source: Streetlight Data Analysis

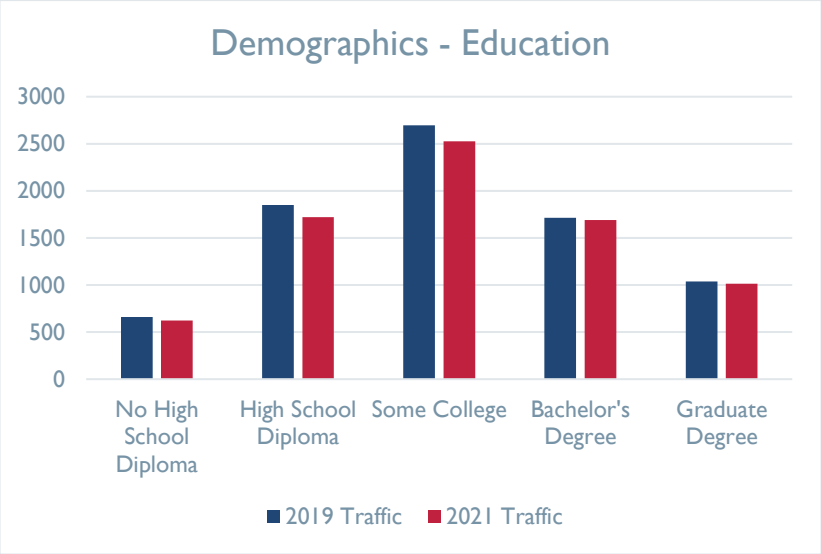
Trip Demographics

A look at StreetLight trip demographic results alongside both passenger traveler and airport worker demographics would facilitate a compare/contrast analysis.

By itself, however, data showed that most travelers, whether airport-area employees or airport travelers, are college educated. The data in **Figure 3-10** equate to 33 percent of vehicle travelers to the Airport have completed some college education, approximately 21 to 22 percent have completed a bachelor's, and 13 percent have completed a graduate degree. In total, approximately 34 percent of vehicle travelers to the Airport have college degrees, a number slightly lower than the 39.9 percent of the population (age 25 years or older have a bachelor's degree or higher in the period 2015–2019) reported by the U.S. Census Quickfacts for the City of Colorado Springs.[4]

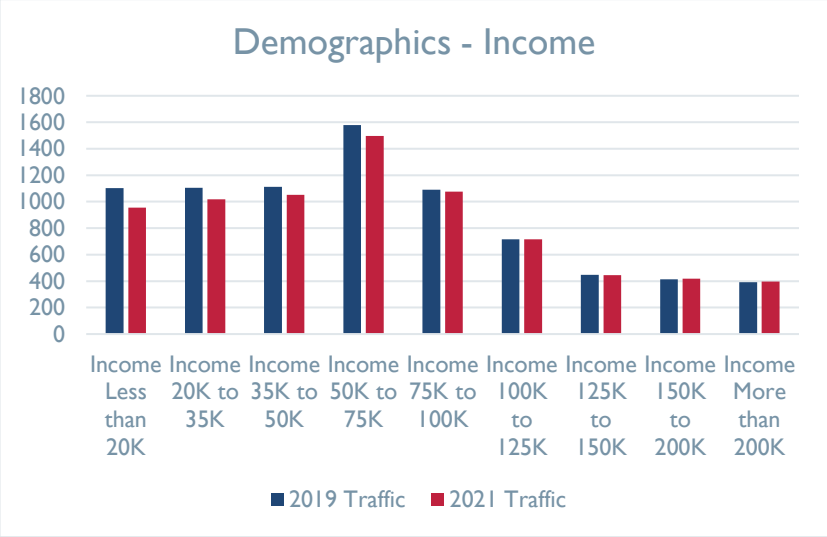
Figure 3-11 shows the most frequently represented income range was $50,000 to $75,000 per year, which accounts for 19.8 percent of vehicle travelers to the Airport in both 2019 and 2021. According to the U.S. Census Quickfacts, the median household income in 2019 dollars in Colorado Springs was $64,712.

Figure 3-10. Trip Demographics - Education



Source: StreetLight Data

Figure 3-11. Trip Demographics - Income



Source: StreetLight Data

[4] United States Census Bureau QuickFacts, Colorado Springs city, Colorado, Population estimates, July 1, 2019

4. Relevant Plans and Studies

Several previous and ongoing plans and studies that are relevant to airport access were reviewed and brief summaries are provided in this section.

PlanCOS (2018)

In 2018, the City of Colorado Springs adopted PlanCOS, the reworked comprehensive plan to guide the future of Colorado Springs following an extensive update process with significant community involvement. PlanCOS is organized around six Vision Themes (VT): Vibrant Neighborhoods, Unique Places, Thriving Economy, Strong Connections, Renowned Culture, and Majestic Landscapes. Within each VT, Big Ideas are identified and supported with goals, policies, and strategies (GP&S). While many GP&S are pertinent to the Airport campus, the Airport is specifically mentioned regarding its importance related to economic growth and the need to support it via the City's transportation network.

PlanCOS Vision Theme: Thriving Economy (TE)
Big Idea: 1 - Brand as the Best
Goal TE-1: Build on our quality of place and existing competitive advantages.
Policy TE-1.D: Enhance our Cornerstone Institutions (Typology 1) campuses, while also integrating them into the surrounding community.
-Strategy TE-1.D-5: Support the growth and adaptation of Colorado Springs Airport to maintain its economic value as an air service provider for the city and region, and to strengthen its role as an integrated hub for economic development.

Big Idea: 2 – Expand Our Base
Goal TE-2: Diversify the local economy by fostering a range of business types and sizes.
Policy TE-2.A: Preserve and strengthen the city's Industry Icons Typology (Typology 5).
- Strategy TE-2.A-1: Identify, accommodate, and provide supportive zoning for key sites for industrial uses with good multimodal access to highways, railroads, and the Airport.

PlanCOS Vision Theme: Strong Connections (SC)
Big Idea: 1-Connect Multimodal Transportation
Goal SC-1: Multimodally connect people and land uses throughout the city and region.
Policy SC-1.A: Plan for and implement transportation projects for the overall mobility of people and to manage the impacts of cars on our built environment.
- Strategy SC-1.A-7: Specifically continue to invest in and adapt facilities and services, including multimodal transportation improvements, in order to increase the number, range and cost-competitiveness of airline flights to and from the Colorado Springs Airport.

Policy SC-1.F: Maximize multimodal transportation options serving the Downtown area to reduce the need for individual car ownership and use by visitors, residents, and employees.
- Strategy SC-1.F-5: Plan for and implement shuttle services, bike-share, and other programs to help travel among Downtown destinations and the airport, in coordination with a Downtown parking plan (see Strategy 1.F-7).

Big Idea: 2-Take Transit to the Next Level
Goal SC-2: Lay the groundwork for an intercity transit connection along the Front Range and for more robust, choice-based transit within the city and larger region.
Policy SC-2.b: Continue to enhance the existing transit system to make it a more viable option and strategically expand the existing system in response to new needs.
- Strategy SC-2.B-5: Provide convenient and inexpensive transit connections between the Colorado Springs Airport and key locations within the city.

ConnectCOS (in development)

One recommendation from PlanCOS was to prepare an Intermodal Mobility Plan to replace the previous version from 2001. Much more than a simple update or revision of the 2001 plan, the development of ConnectCOS included extensive public engagement and a data-driven analysis of the transportation network. ConnectCOS will recommend transportation and mobility improvements based on six goal areas: Safe, Equitable, Sustainable, Reliable, Accessible, and Connected. The maps on the following pages show the results of the roadway assessment completed during the critical corridor determination process in ConnectCOS. The text below highlights the findings or applicability in proximity to the Airport.

Traffic and Intersection Performance: **Figure 4-1** shows the traffic and intersection performance candidates relative to all corridors and intersections in the system. Proby Pkwy, Marksheffel Rd, and northbound Powers Blvd (north of Proby Pkwy) and Powers Blvd in both directions south of Proby Pkwy rank well. Southbound Powers Blvd (SH 21), eastbound Platte Ave, and Hancock Expy rank as midlevel in corridor performance. Airport Rd, eastbound US 24/Fountain Blvd and, further west but an important route for airport travelers and employees, S Academy Blvd ranks midlevel or worse, depending on the segment and direction of travel. The intersection of US 24 and SH 94 is the nearest intersection that ranks as poorly performing.

Community Activity Centers: Figure 4-2 shows that PlanCOS identified the Airport and Peterson SFB as Regional Employment and Activity Centers. As a result, Powers Blvd (north of the Airport) and S Academy Blvd (to the west) are identified as important corridors. The active transportation network includes north-south trails to the east (get name) and west (E Sand Creek Trail) of the Airport.

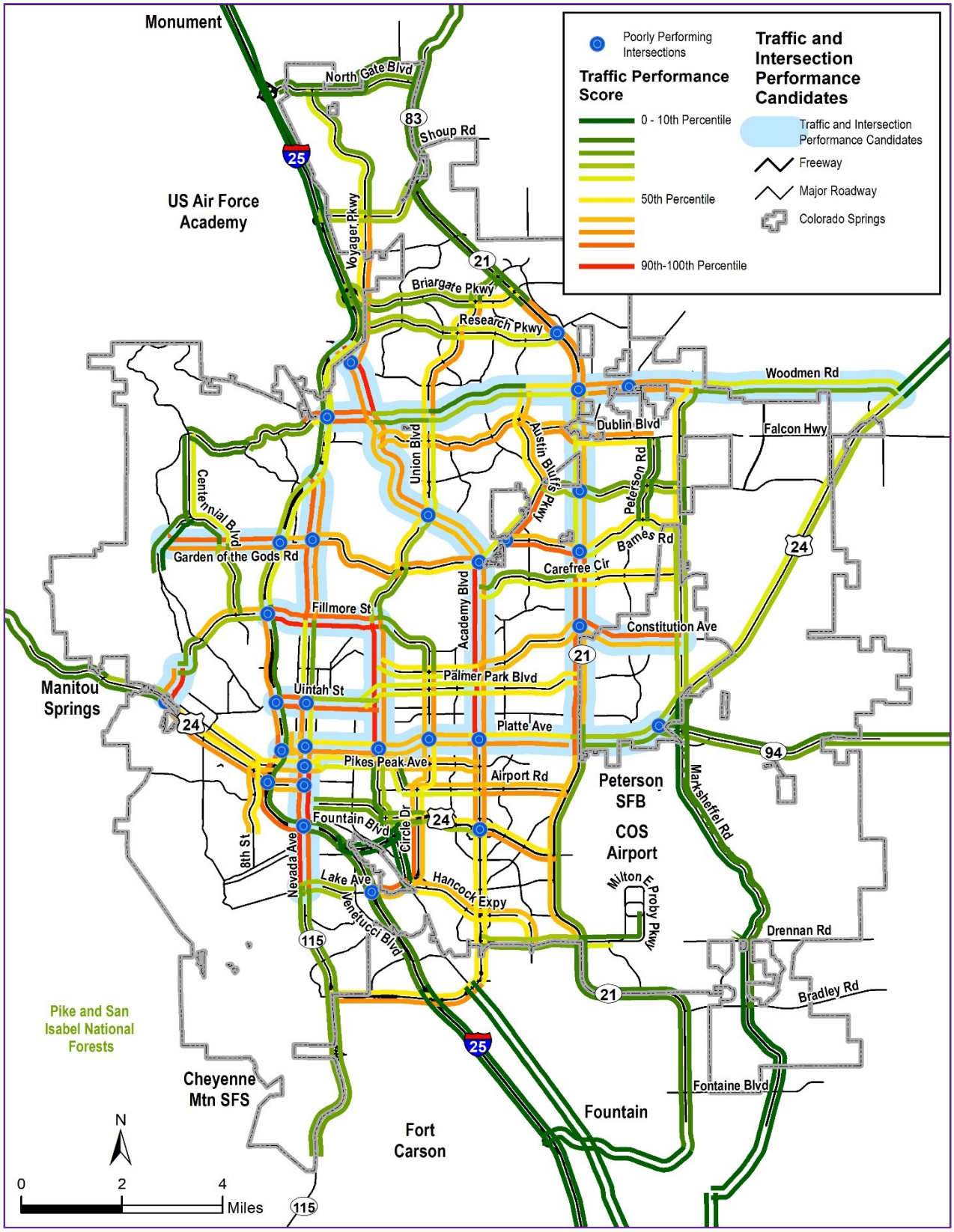
Transit Propensity: Transit propensity factors in a demographic need for mobility options, population density, and accessibility needs to key community destinations and services. **Figure 4-3** identifies the Airport and Peterson SFB as a key community destination and shows existing bus routes near the Airport. Note the assessment was completed prior to commencement of Route 37 to the Airport. **Figure 4-3** identifies multiple corridors that are candidates for additional transit coverage. Those in proximity of the Airport include Hancock Expy, Proby Pkwy, Powers Blvd, US 24/Fountain Blvd, and Platte Ave (east of Powers Blvd).

PlanCOS Strong Connections Priorities: Figure 4-4 shows which corridors were identified in PlanCOS as important to the priority vision of Strong Connections. Near the Airport, both Powers Blvd and US 24 are identified as priority corridors for multimodal and smart street/emerging technology enhancements. Additional corridors shown previously in the Airport's regional access network (Figure 2-1) include Nevada Ave, Academy Blvd, Woodmen Rd, and the northern portion of Powers Blvd.

Anticipated Major Land Use Changes: Figure 4-5 shows that the Airport is surrounded by the high likelihood of land use change, particularly to the east, where Banning Lewis Ranch and other developments are planned for buildout over the long term. Marksheffel Rd is an important north-south corridor to serve those future developments.

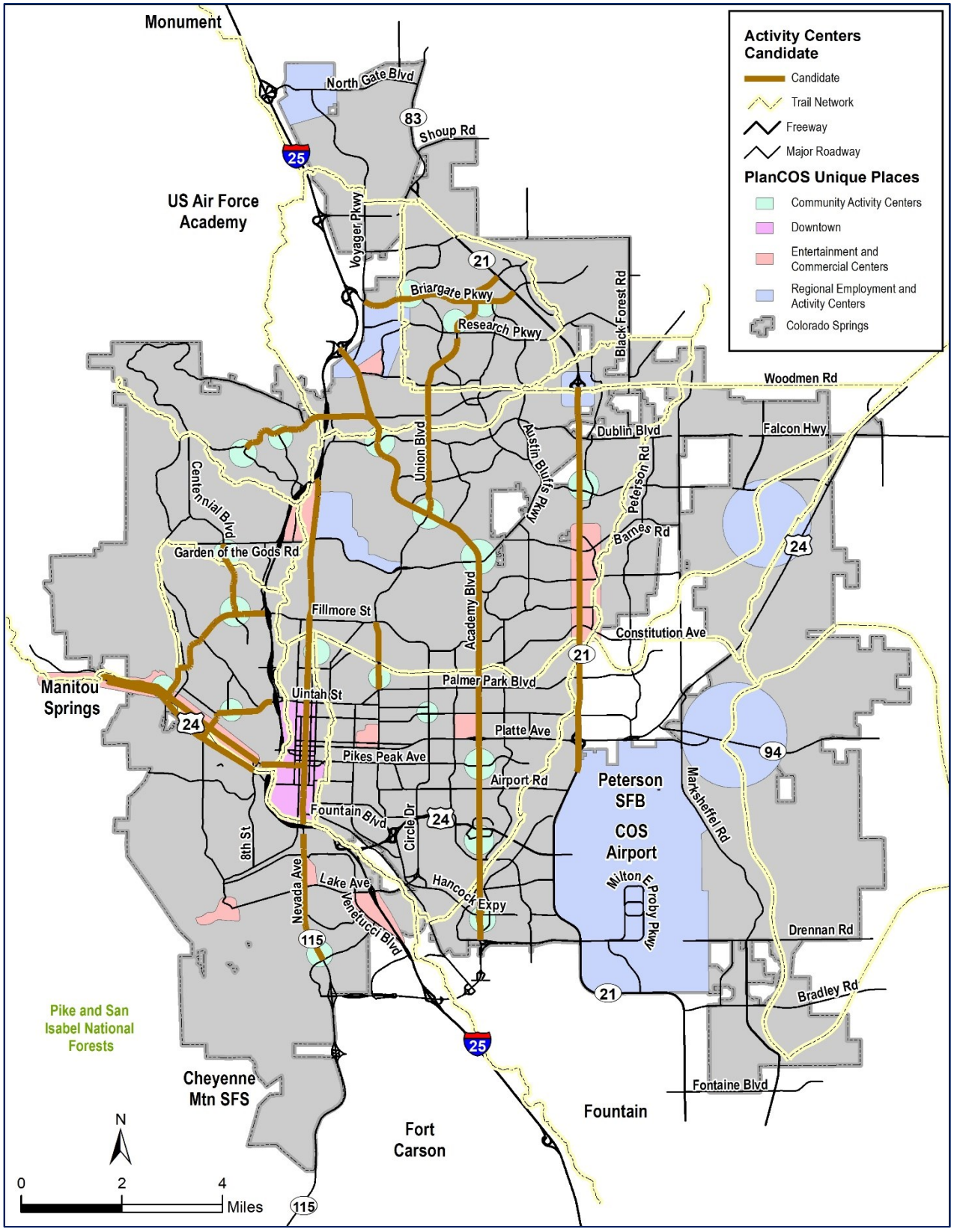
ConnectCOS Critical Corridors: Figure 4-6 shows the roadway assessment results, which identified 31 corridor segments critical to the City's transportation system. These corridors were then further studied to identify needs and solutions in relation to the six ConnectCOS goal areas. The three corridors surrounding the Airport – Powers Blvd (SH 21), Platte Ave/US 24, and Marksheffel Rd – were found to be critical corridors, as well as Airport feeder corridors US 24/Fountain Blvd and Hancock Expy.

Figure 4-1: Traffic and Intersection Performance Candidates



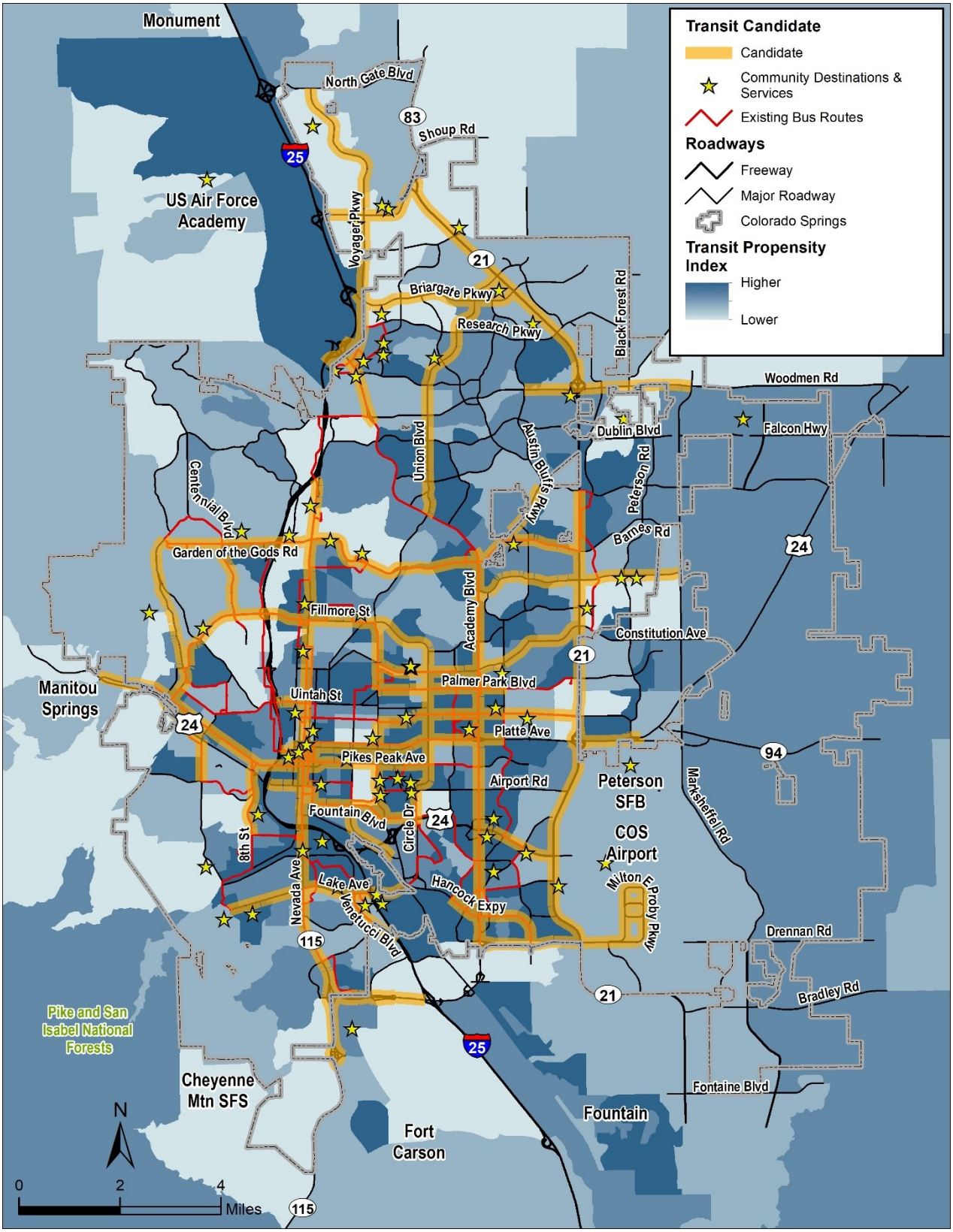
Source: ConnectCOS Transportation System Assessment Working Paper

Figure 4-2: Activity Centers



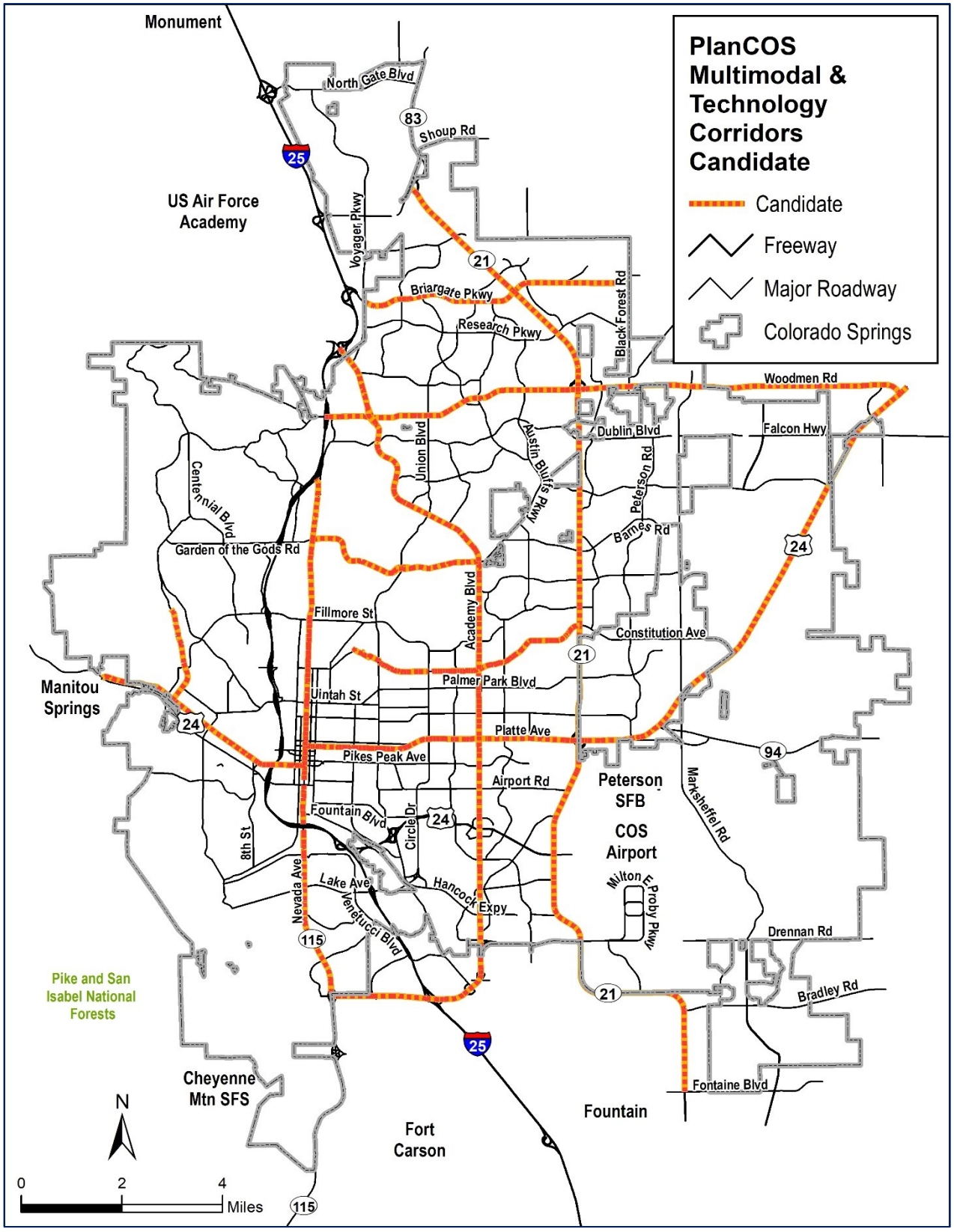
Source: ConnectCOS Transportation System Assessment Working Paper

Figure 4-3: Transit Candidate Corridors



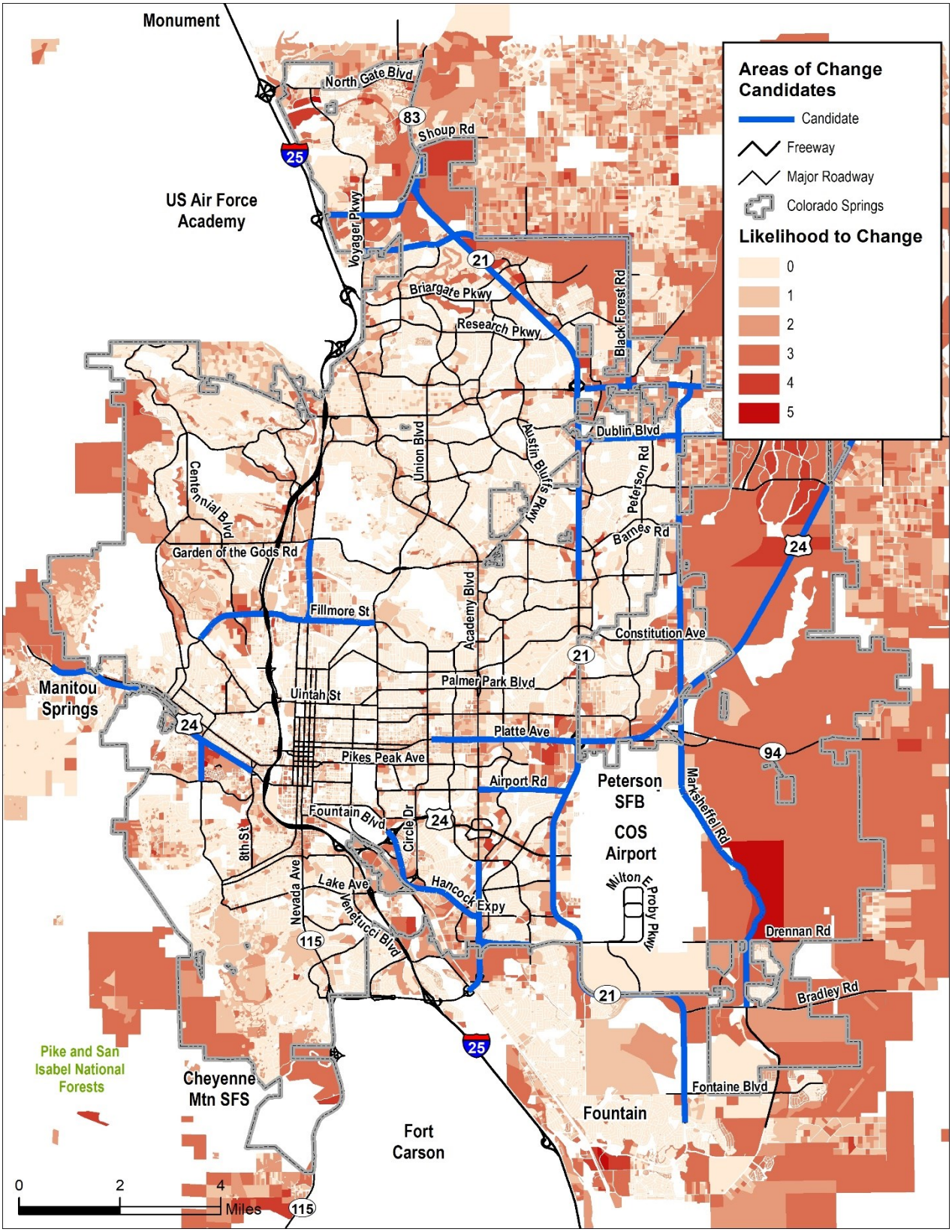
Source: ConnectCOS Transportation System Assessment Working Paper

Figure 4-4: PlanCOS Existing Multimodal & Technology Corridors Candidates



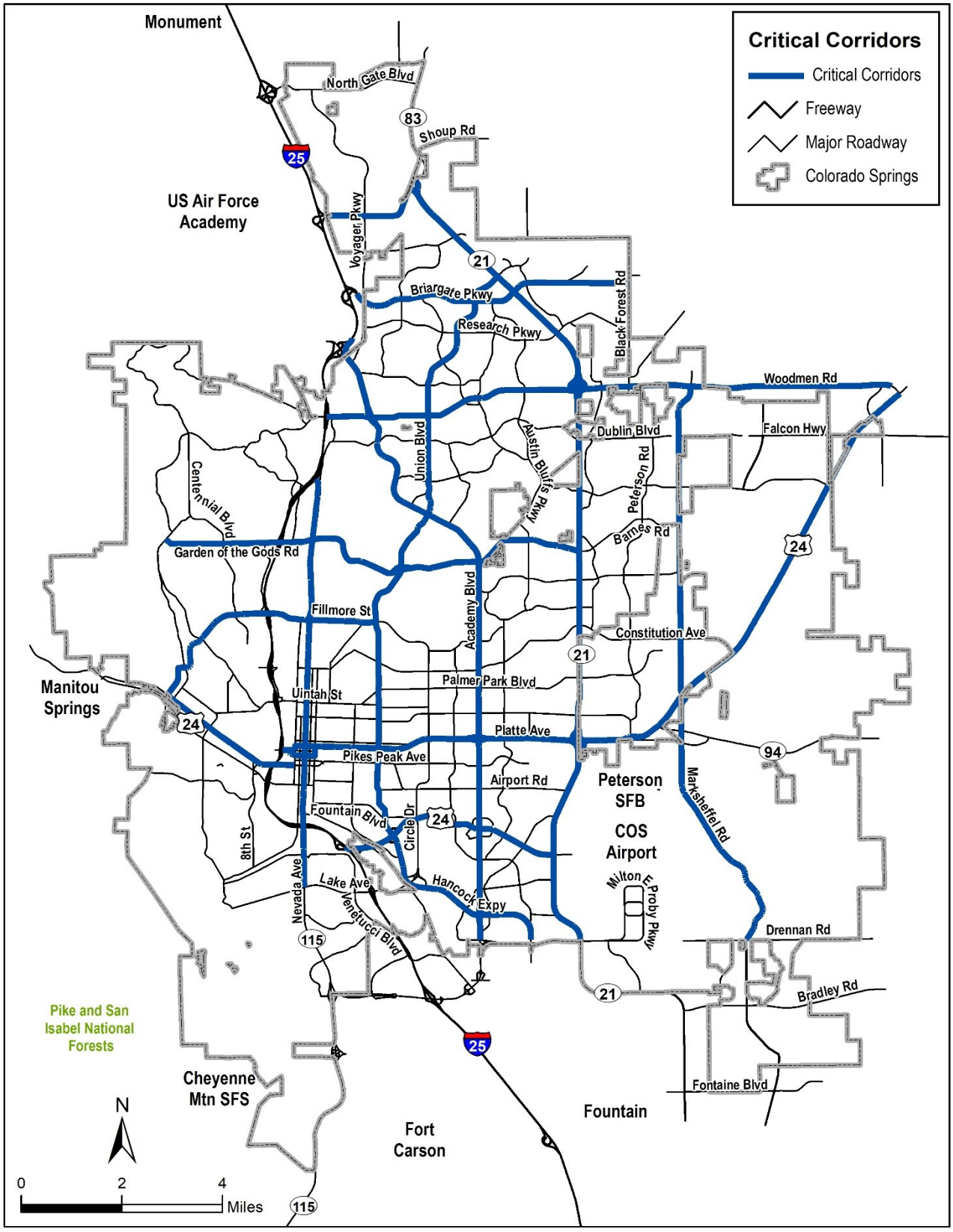
Source: ConnectCOS Transportation System Assessment Working Paper

Figure 4-5: Areas of Change Candidates



Source: ConnectCOS Transportation System Assessment Working Paper

Figure 4-6: Critical Corridors



Source: ConnectCOS Transportation System Assessment Working Paper

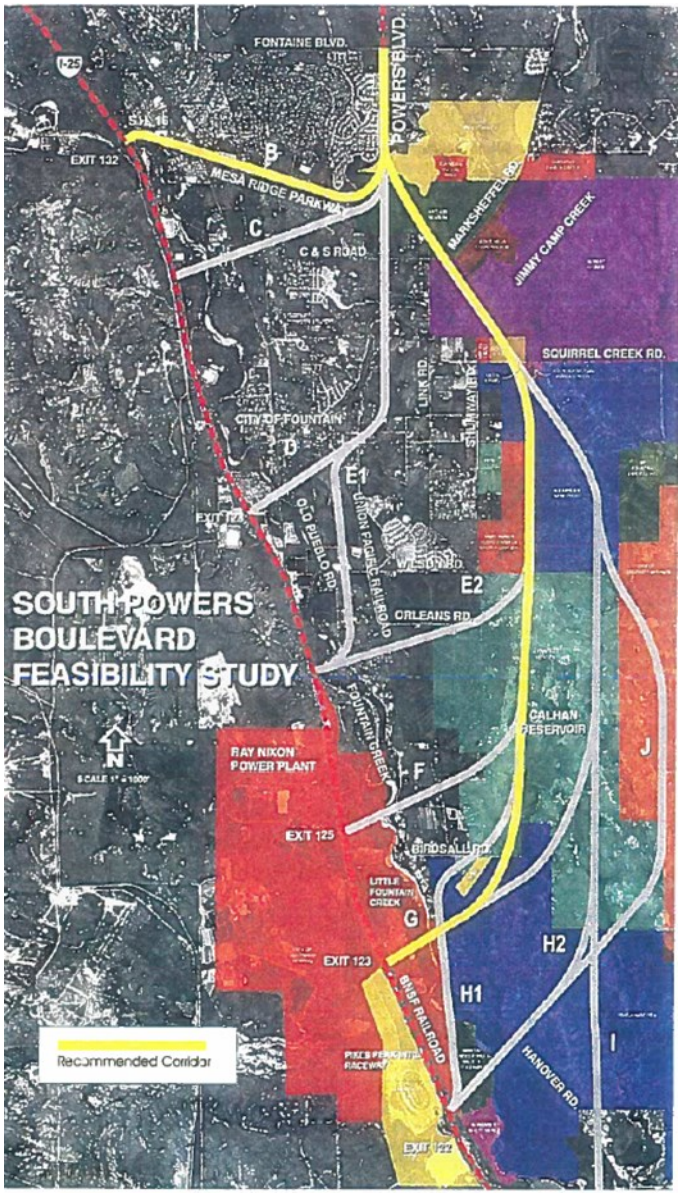
South Powers Boulevard Feasibility Study and Planning and Environmental Linkage (2000 and ongoing)

The South Powers Boulevard Feasibility Study was completed in 2000 to determine a preferred corridor plan and alignment for the extension of Powers Blvd south from Fontaine Blvd to its connection with I-25. The initial study addressed the extension of Powers Blvd from its current terminus at Mesa Ridge Pkwy (SH 16), south of Fountain. **Figure 4-7** shows the recommended corridor connects to I-25 at Exit 123.

In 2022, El Paso County, in coordination with PPACG, CDOT, Fountain, and Colorado Springs, is beginning the next step for this project with a planning and environmental linkages (PEL) study and access control plan that continue the effort of the 2000 feasibility study.

This collaborative planning study is intended to document the specific purpose and need for improvements, develop, and screen a range of reasonable alternatives, identify a preferred alternative, and develop an access management plan. The County anticipates that the outcome of the study will be the adoption of the recommendations of this study by the Pikes Peak Area Council of Governments (PPACG), El Paso County, CDOT and Cities of Fountain and Colorado Springs. This study will document relevant decisions and processes that can be utilized during the scoping process for subsequent NEPA documents.

Figure 4-7: Recommended Corridor



Source: South Powers Boulevard Feasibility Study, July 2000, URS

Banning Lewis Ranch Master Plan (2017)

The Banning Lewis Ranch Master Plan map was updated in 2015 and approved by City Council in October 2017. Banning Lewis Ranch Pkwy will serve as a north-south spine, and multiple east-west arterials will connect to Marksheffel Rd and US 24. At the south end, roadway connections will provide access to the Airport via Bradley Rd to Powers Blvd. The planned land uses and roadway connections to the existing network. Are still being refined.

Mountain Metro Transit 2045 Regional Transportation Plan – Transit (January 8, 2020)

The 2045 Regional Transportation Plan – Transit (Transit Plan), an appendix to the PPACG 2045 Regional Transportation Plan, documents the analysis of demographic projections and fixed-route transit service between now and 2045.

Citing the 2017 American Community Survey (ACS) 5-Year Estimates, the report shows 0.8 percent of people in the Pikes Peak region use public transportation to commute to work.

Chapter 6 of the Transit Plan summarizes the needs and recommendations developed with input from the Plan's advisory committee and stakeholders. While there is considerable focus on improving the user experience in existing service areas, there is recognition of the opportunities with new service models, particularly routes serving the area's military installations and the Airport.

The Plan's Table 6-5: Potential Destinations and New Service Models includes the Colorado Springs Airport as follows:

"Consider focused and branded express services from downtown and park and ride locations. This service must be coordinated with arrivals, departures, and employee shift times. To maximize success, it is recommended that this service be designed based on the airport's needs and not integrated with other traditional routes."

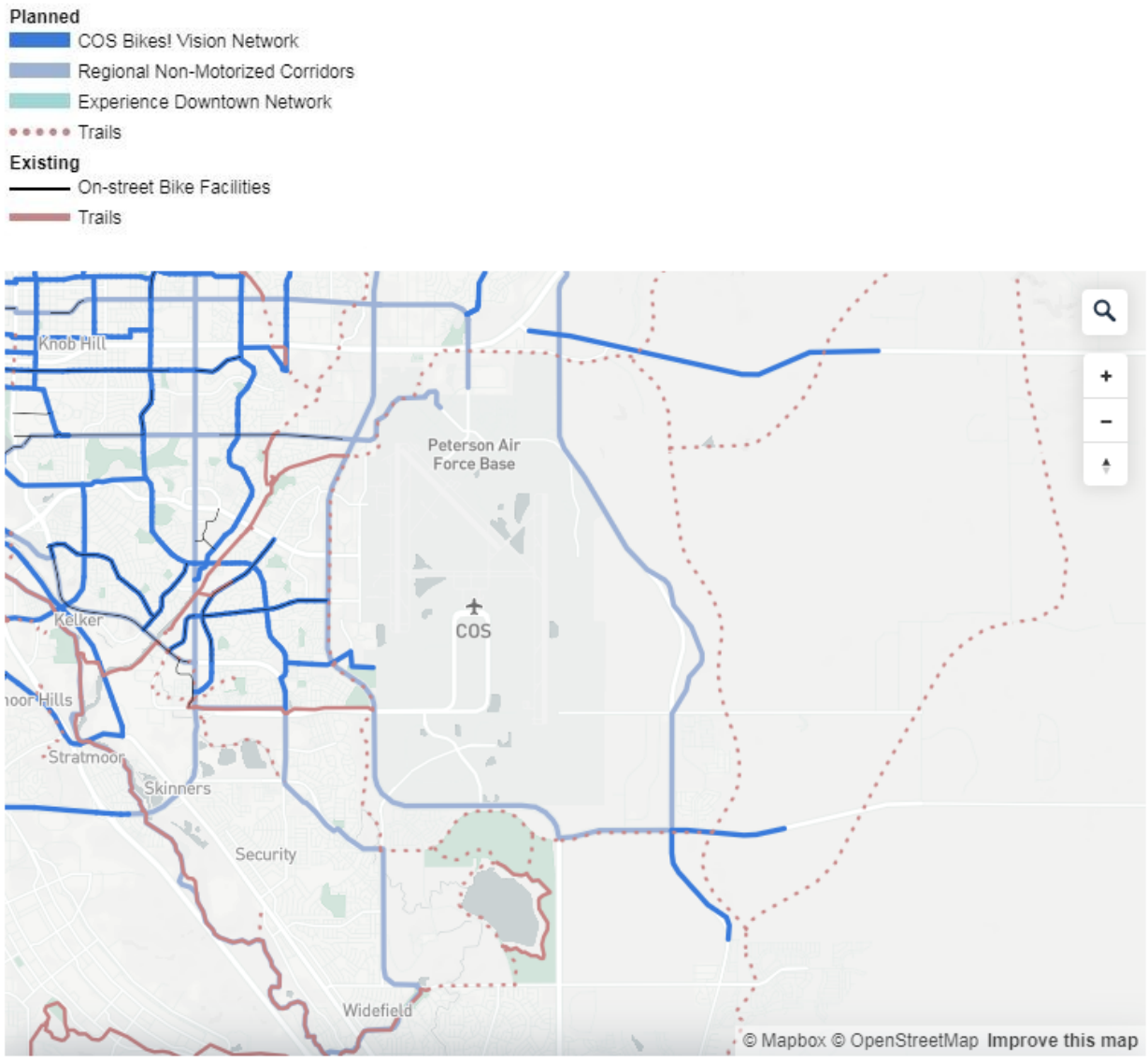
The Plan's Appendix A: Mountain Metropolitan Transit DRAFT 2045 Unconstrained Transit Projects List provides the following details:

- **2045 Plan Theme**: Improve Service Hours, Frequencies, and Reliability
- **Potential Priority**: II - Mid Term
- **Project Name**: Partner, Study, and Pilot New Airport Express Route
- **Project Description**: Unconstrained Partner, study, and pilot airport an express route.
- **Funding Need ($ Millions)**: $ 0.50

Bike COS Master Plan (adopted 2018)

The City Council approved the Colorado Springs Bicycle Master Plan in April 2018. The plan, named COS Bikes!, does not make specific bike facility recommendations, but it does provide a toolbox of facility types, designs, spot treatments, and supporting elements, as well as a Vision Network of streets and trails that would improve connectivity and access to destinations across the city.[5] **Figure 4-8** shows existing and planned bike facilities in the vicinity of the Airport. Connections to the Airport, particularly within the General Aviation and Cargo area, Peterson SFB, and the Peak Innovation Park, would facilitate active transportation alternatives for employees.

Figure 4-8: COS Bike Master Plan Vision Network, Online Map

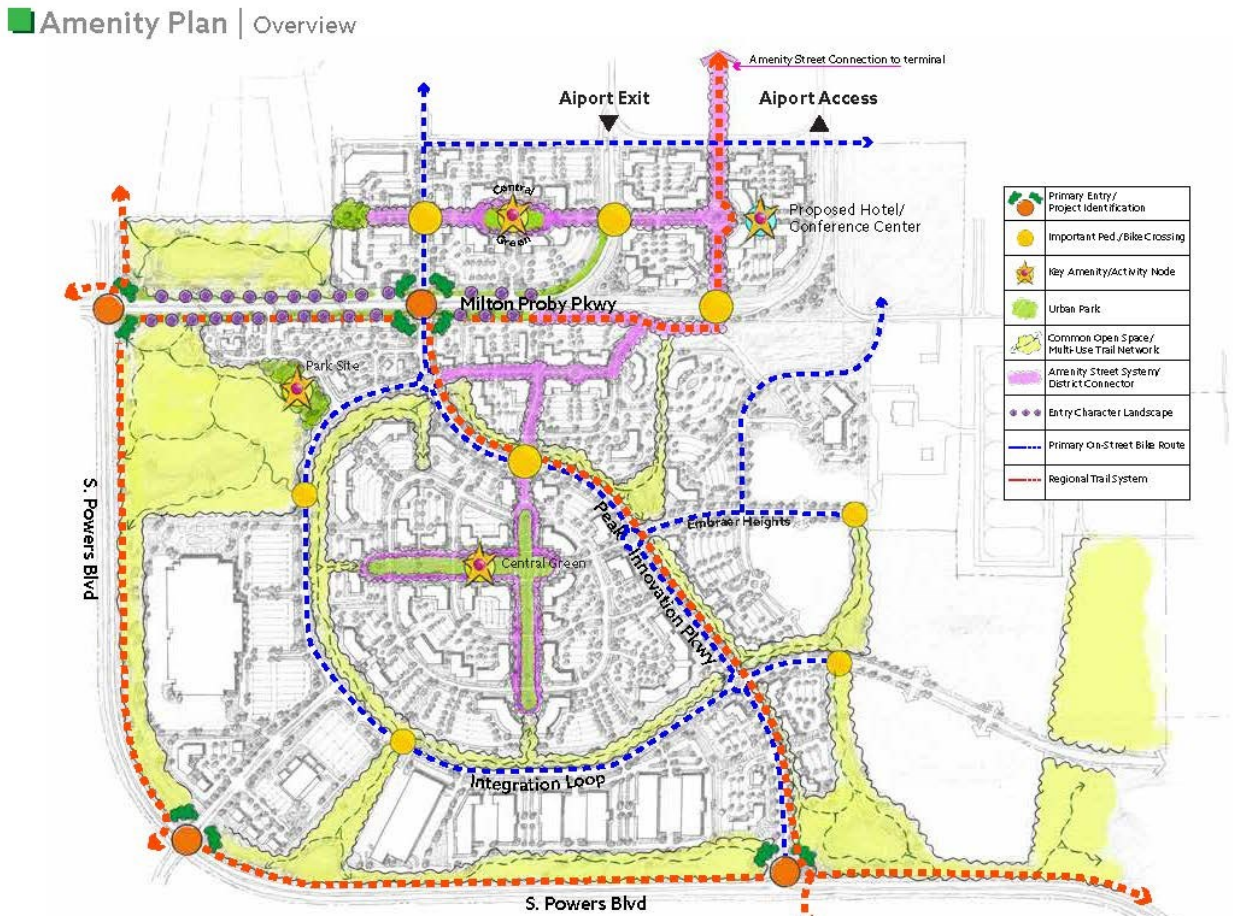


Source: ColoradoSprings.gov

Figure 4-9 shows the proposed trail network within Peak Innovation Park.

[5] https://coloradosprings.gov/bikes/page/bike-master-plan-chapter-3-building-connections#Vision

Figure 4-9. Proposed Peak Innovation Park Trail Network



Source: Peak Innovation Park

PPACG Regional Nonmotorized Transportation System Plan (Adopted 2015)

The purpose of the Regional Nonmotorized Transportation System Plan was to create a regional plan to guide improvement of the nonmotorized network, which could lead to an increase in the number of people using the active transportation network. The PPACG collaborated with El Paso County, the City of Colorado Springs, and the City of Woodland Park. Goals for the network included better connectivity, safety, public awareness, and development of traveling environment that makes bicycling and walking a more attractive alternative to vehicle travel.

Table 4-1 lists the trail corridors that provide an active transportation alternative to access the Colorado Springs Airport.

Table 4-1: Nonmotorized Trails in the Vicinity of the Airport

Corridor	Corridor Title
15	City of Fountain to Colorado Springs Airport
23	Peterson AFB to Downtown Colorado Springs
25	Pikes Peak Greenway to Colorado Springs Airport
31	Westside (N 31st St) to Cimarron Hills (Peterson AFB)
63	Woodman (Woodmen) Road/Marksheffel Road to Fountain Mesa Road
65	Schriever AFB to Cimarron Hills via US Highway 94/Enoch Road

Source: PPACG Regional Nonmotorized Transportation System Plan, 2015

The Link – Powers Corridor (2009, 2010)

CDOT completed an Environmental Assessment (EA) in 2009 and a Finding of No Significant Impact (FONSI) in 2010, for the Powers Boulevard (State Highway 21) corridor between Woodmen Road and SH 16.

Figure 4-10 shows the Proposed Action, which calls for upgrading Powers Boulevard between Woodmen Road and Milton E. Proby Parkway to a 6-lane freeway, with grade-separated interchanges in the vicinity of the COS Airport at Airport Road, US 24/Fountain Boulevard, Hancock Expressway, and Milton E. Proby Parkway. South of the Airport, between Milton E. Proby Parkway and SH 16, the Proposed Action includes obtaining right-of-way for future 4-lane freeway with grade-separated interchanges at major cross-roads, including Grinnell Boulevard, Bradley Road, Fontaine Boulevard, and an identified future connection that is now Peak Innovation Parkway.

Figure 4-10. The Link EA's exhibit showing proposed action

Exhibit 3-10. Summary of the Proposed Action and the No-Action Alternative

Powers roadway mainline

Proposed Action

- Upgrade to 6-lane freeway with acceleration lanes, Woodmen Road to Milton E. Proby Parkway
- Obtain right-of-way for future interchanges for a 4-lane freeway from Milton E. Proby Parkway to SH 16

No-Action Alternative

No modifications to the existing road, which is:

- 6-lane expressway, Woodmen Road to Airport Road
- 4-lane expressway, Airport Road to SH 16

Connection with cross-streets

Proposed Action

Build grade-separated interchanges at the 11 arterial crossings denoted with a solid dot in the figure at left; build overpasses at three cross-streets denoted with an open dot (South Carefree Circle, Aeroplaza Drive, and Astrozon Boulevard), allowing traffic to cross under Powers Boulevard with no direct access; direct access also would no longer be available at four side-streets streets—Victor Place, Waynoka Road, Omaha Boulevard, and Triple Crown Way. Generally, ramp and local street changes would be made to mitigate loss of direct access.

No-Action Alternative

No modifications to the existing connections, which are: interchanges at Platte Avenue and Woodmen Road; 15 at-grade, signalized intersections; unsignalized access at other existing cross-streets.

Ramp and frontage road features

Proposed Action

- Build a southbound frontage road on the western side of Powers Boulevard from Barnes Road to Palmer Park Boulevard.
- Build a northbound frontage road on the eastern side of Powers Boulevard from Galley Road to Palmer Park Boulevard, and another from North Carefree Circle to Barnes Road.
- Build "Texas turnaround" ramps on Powers Boulevard at three locations near Constitution Avenue and Palmer Park Boulevard, enabling traffic to access either direction of Powers Boulevard without going through a signalized intersection.

No-Action Alternative

No new ramps or frontage roads are anticipated.

CDOT is currently proceeding with preliminary design for an interchange at Airport Road and the City of Colorado Springs has completed a conceptual design for a Milton E. Proby Parkway interchange.

Peak Innovation Park, Traffic Impact Study (2020)

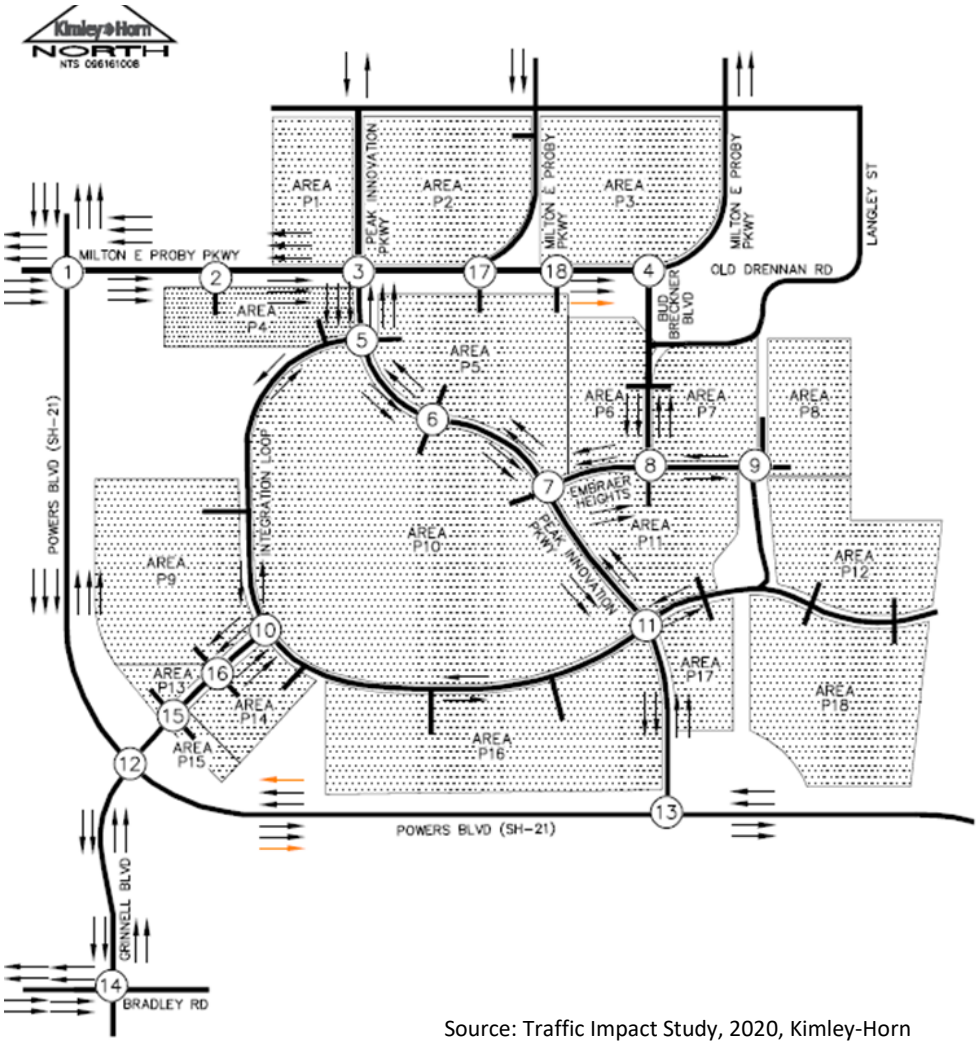
The conceptual preferred land use plan for Peak Innovation Park shows two distinct mixed-use zones with street, trail, and pedestrian connections to the Airport, business park, and surrounding community and proposed future connection between Bradley Road and S Powers Blvd.

To evaluate the impacts and needs related to the continued development of Peak Innovation Park, Kimley-Horn completed a traffic study to identify traffic generation characteristics, identify potential traffic-related impacts, and develop mitigation measures. **Table 4-2** shows the estimated trip volumes that the three phases of development will generate.

Table 4-2. Peak Innovation Park Estimated Trip Volumes

Phase (Completion Date)	Anticipated Daily Weekday Trips	Morning Peak Hour Trips	Afternoon Peak Hour Trips
1 (2022)	27,532	3,173	2,255
2 (2030)	52,764	5,023	3,826
3 (2045)	97,058	8,565	6,788

Figure 4-11: Peak Innovation Park, Full Buildout 2045 Recommended Lane Configurations and Control



Source: Traffic Impact Study, 2020, Kimley-Horn

The study concludes that traffic generated by the Peak Innovation Park will be successfully incorporated into the roadway network and recommends specific intersection improvements for each phase to mitigate the increases. Most of the improvements include turn lanes.

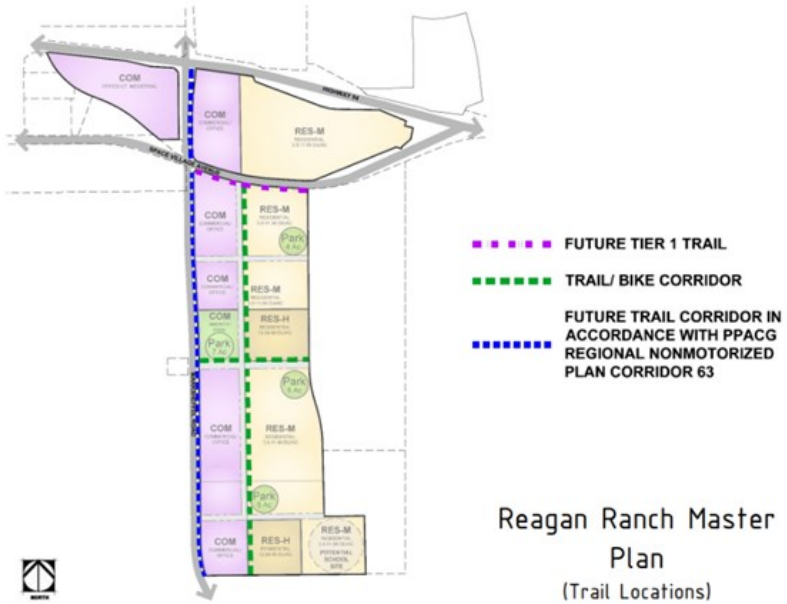
Figure 4-11 shows the recommended full buildout lane configurations and controls. A grade-separated interchange is recommended for intersection 1. Traffic signals, if not already present, are recommended for intersections 3, 6, 7, 10, 11, 12, 13, 14, 15, and 16.

Reagan Ranch Master Plan (January 2021)

Reagan Ranch is a planned mixed-use development east of Peterson SFB, which is to include approximately 1,500 housing units, office space, a business park, and retail space. The development will occur south of SH 94 and ESE of the Marksheffel/Space Village intersection.

The Reagan Ranch Metropolitan District was approved by COS City Council on August 25, 2020. **Figure 4-12** shows the Master Plan's future trail/bike corridors along Marksheffel Rd, Space Village Ave, and an internal road to expand the area's active transportation network and provide connectivity.

Figure 4-12. Reagan Ranch Master Plan, Trail Locations


FUTURE TIER 1 TRAIL
TRAIL/ BIKE CORRIDOR
FUTURE TRAIL CORRIDOR IN ACCORDANCE WITH PPACG REGIONAL NONMOTORIZED PLAN CORRIDOR 63
Reagan Ranch Master Plan
(Trail Locations)

Source: PRCS Advisory Board presentation dated Jan. 14, 2021

Traffic Impact Study, Reagan Ranch (2021)

To evaluate the impacts and needs related to the planned 5-year buildout of Reagan Ranch, Kimley-Horn identified traffic generation characteristics and potential traffic-related impacts and developed mitigation measures for identified impacts. The evaluation included intersections along corridors considered key to airport access:

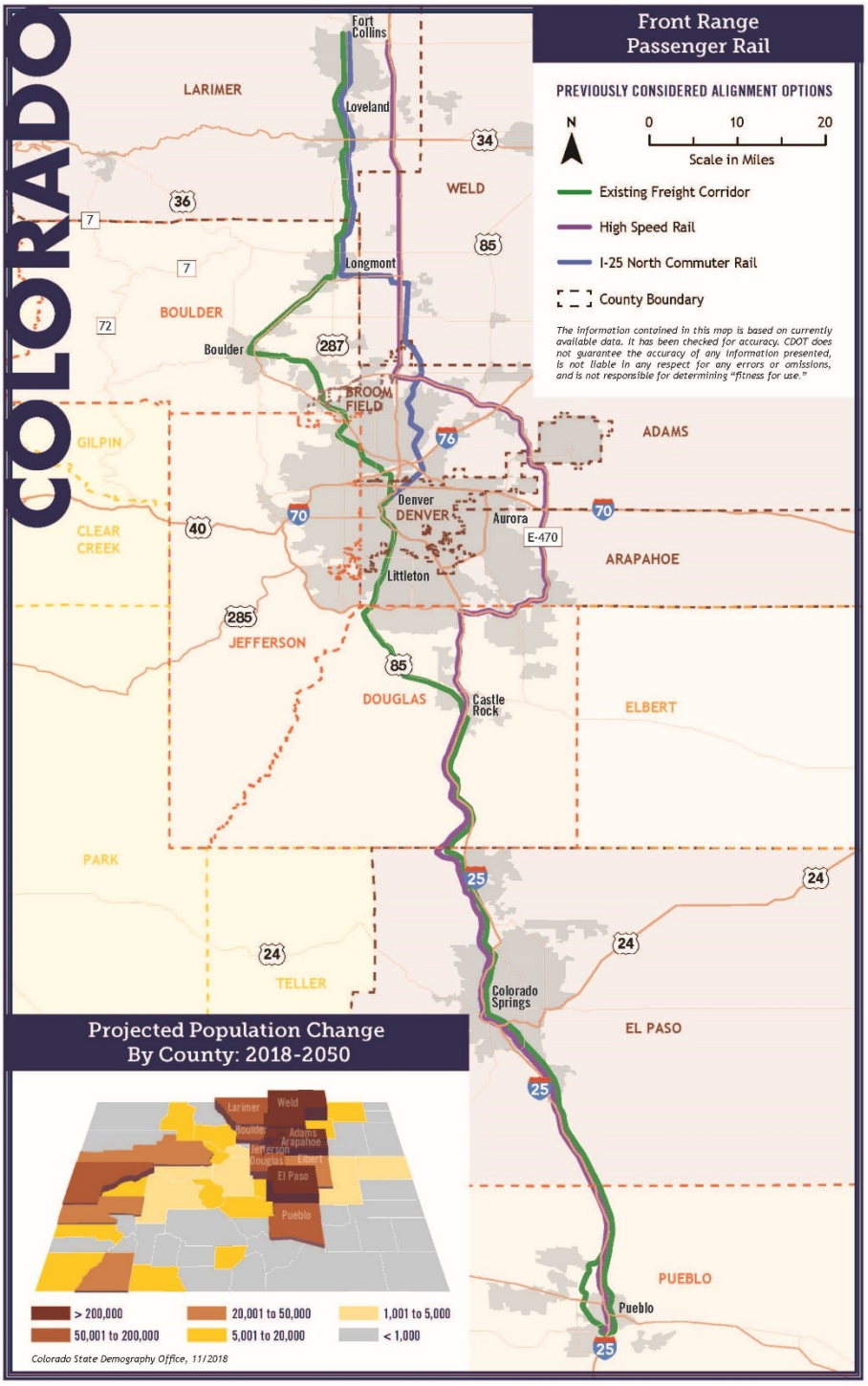
- Marksheffel Rd and US 24
- SH 94 and Marksheffel Rd
- SH 94 and Space Village Ave
- Space Village Ave and Marksheffel Rd
- SH 94 and US 24

The study concludes that the expected traffic volumes will be successfully incorporated into the roadway network with specific 2025 recommendations regarding lane and intersection configurations (through, left- and right-turn, acceleration, and deceleration), intersection controls, and CDOT permitted accesses.

Front Range Passenger Rail (2018)

The Front Range Passenger Rail Commission coordinates efforts by state and local government to pursue passenger rail service for the Front Range of Colorado, between Pueblo and Fort Collins. The most recent product of the Commission is the Front Range Passenger Rail Alternatives Evaluation Report, prepared in December 2020. The study evaluated three different alignments through the Denver metropolitan area, with each alignment using the consolidated Union Pacific/BNSF Railroad corridor through Colorado Springs. The next step planned is a more detailed project development study, including preliminary design and environmental assessment. Project characteristics such as project phasing and location of stations in Colorado Springs would be further defined in this upcoming study.

Figure 4-13. Previously considered alignments for the Front Range Passenger Rail



Front Range Passenger Rail Station Study

Colorado Springs is currently conducting a study to determine the best location for the Colorado Springs Front Range Passenger Rail station, which will also serve planned AMTRAK service. The study will identify the preferred location from among four alternatives being evaluated in central and southern parts of the city.

5. Challenges & Opportunities

The information gathering and evaluations documented in Sections 1 through 4 of this report resulted in the identification of several challenges and issues related to access to the Airport. Following are high-level descriptions of challenges and issues organized around five issue areas. For each of these issue areas, potential solutions are listed, most of which are projects or recommendations that are in existing Colorado Springs, CDOT, El Paso County, Pikes Peak Area Council of Governments, or other plans.

Airport Access to the East

Challenge

The area to the east of the Airport is expected to experience sharp growth over the next 20-plus years, including commercial development in proximity of the Airport, the Banning Lewis Ranch in eastern Colorado Springs, and areas of unincorporated El Paso County. Airport access options are currently limited to indirect routes via US 94/US 24 on the north and Bradley Road/Powers Boulevard on the south. There is a need for more direct Airport access to and from these growth areas.

Solutions

New access roads to the east are in the planning stage by Peak Innovation Park and City planners including:

- An access road south and east of runways, connecting between Peak Innovation Parkway and Marksheffel Road. This access road should be planned as a relatively high-speed and high-capacity arterial roadway with an alignment south and east of the Airport runway clear zone.
- A road connecting between the access road described above and Bradley Road southeast of Peak Innovation Park.

Address Congestion

Challenge

Several road segments on key regional access routes to the Airport are or are projected to be highly congested without improvements, including:

- Powers Boulevard - Bradley Road to Carefree Circle
- Marksheffel Road - Platte Avenue to Drennan Road and south of Bradley Road
- Academy Boulevard - I-25 to Las Vegas Street
- Fountain Boulevard (US 24) – Union Boulevard to Powers Boulevard
- Airport Road - Academy Boulevard to Powers Boulevard
- Platte Avenue – Circle Drive to Constitution Avenue
- Bradley Road – East of Marksheffel Road

Solutions

Each of these roadways has improvement projects that are expected to be included in the 2022 Colorado Springs transportation plan (ConnectCOS) or are included in CDOT or El Paso County planning:

- Powers Boulevard – CDOT planning calls for a program to upgrade Powers Boulevard north of Milton E. Proby Parkway to a 6-lane freeway, along with right-of-way preservation for long-range upgrade to a freeway-level facility south of Milton E. Proby Parkway. CDOT is currently conducting a preliminary design project for a future Airport Road grade-separated interchange and plans to initiate an alternatives evaluation/conceptual design project for a grade-separated interchange at Milton E. Proby Parkway.
- Marksheffel Road – ConnectCOS will include projects to widen and add bicycle/pedestrian improvements on Marksheffel Road between Woodmen Road and Drennan Road. Improvements to unincorporated El Paso County segments of Marksheffel Road to the south are included in the County's Major Transportation Corridors Plan.
- Academy Boulevard – Colorado Springs plans projects to identify transit, roadway, and bicycle/pedestrian improvements for Academy Boulevard north of Milton E. Proby Parkway and the El Paso County Major Transportation Corridors Plan includes plans to widen the segment south of Milton E. Proby Parkway in the unincorporated county. A corridor study to more specifically define improvements is planned by Colorado Springs to begin within one to two years.
- Fountain Boulevard (US 24) – ConnectCOS includes plans to conduct a major transportation corridor study to determine safety, traffic operations, transit operations, and functionality of US 24 from Falcon to I-25. Analyze the function of US 24 in the region's transportation network and consider alternatives for US 24 such as Woodmen Road to meet long-term needs. This study is expected to address inconsistency in the functionality of different segments of the corridor between Union Boulevard and Powers Boulevard.
- Airport Road – As stated in the Powers Boulevard bullet above, CDOT is currently developing design plans for a grade-separated interchange at Airport Road/Powers Boulevard. This will address the most significant current bottleneck for Airport Road.
- Platte Avenue – Colorado Springs is currently completing the Platte Avenue Community Corridor Study, which is developing a program of multimodal improvements to the Platte Avenue corridor between downtown and east of Powers Boulevard.
- Bradley Road – The El Paso County Major Transportation Corridors Plan includes widening of Bradley Road between Marksheffel Road and Curtis Road to the east.

Improved Connection to I-25

Challenge

The main route identified from I-25 to the Airport is currently via Academy Boulevard and Milton E. Proby Parkway. Improvements to the traffic flow along this route and wayfinding improvements would enhance access to the airport from I-25.

Solutions

Potential enhancements to I-25 – Airport access include:

- CDOT and City are developing conceptual plans for a future grade-separated interchange at Milton E. Proby/Powers intersection, as discussed above
- Enhanced use of US 24/Fountain Boulevard as an I-25 – Airport access route can be explored through the US 24 functionality study cited above.
- Improved wayfinding signage on I-25 and along routes between I-25 and the Airport. It is recommended that the Airport coordinate with City Public Works and CDOT to evaluate the current airport wayfinding signage (see Figure 2-21) and identify potential updates and enhancements based on current travel patterns.

Improved Public Transit Connections:

Challenge

Public transit service to/from the Airport and surrounding development is currently limited to local bus service via Route 37 between the Airport and Hancock Plaza. Transit service for Airport employees or passengers requires one or more transfers and long travel times to most destinations in the city.

Solutions

Improvements to transit service that can be considered in the short- and mid-range future in coordination with Mountain Metro Transit include:

- Improve directness and travel time to/from Downtown
- Add a local bus route to the north using Powers Boulevard
- Improve frequency and hours of service to accommodate passenger and worker needs

The Airport should coordinate with the City and regional agencies on additional regional transit initiatives in the longer range future:

- Coordinate with the City on future Front Range Passenger Rail, including:
  - A passenger-friendly bus connection between the future Colorado Springs station and the Airport
  - Support stops between Colorado Springs and Denver, such as at Monument and Castle Rock, to support access to the Colorado Springs Airport
- Coordinate with the City and Mountain Metro on implementation of Enhanced Transit routes that are currently being finalized for inclusion in the ConnectCOS final plan. Segment of Powers Boulevard, Platte Avenue, Hancock Expressway, Marksheffel Road, and Milton E. Proby/Drennan Road are under consideration as potential Enhanced Transit Routes.

Improved Bike Access:

Challenge

Bicycle travel could be an option for Airport or Peak Innovation Park workers, both for commuting and for workday recreational riding. Several Peak Innovation Park streets have been or are being built with bicycle lanes or paths, but safe and convenient routes on city streets accessing the Airport are limited.

Solutions

Adding bicycle routes that are identified on the City's Bicycle Vision Network and enhancing the safety and convenience of existing bicycle routes would improve bicycling opportunities for Airport area workers. The Airport should continue to work with Peak Innovation Park planners on development of the Peak Innovation Park Future Trails Plan (shown in Section 4 of this report) and work with the City on implementation of the Bicycle Vision Network that is being refined as part of the ConnectCOS process.